THROUGH BY RAIL

By CHARLES GILBERT HALL

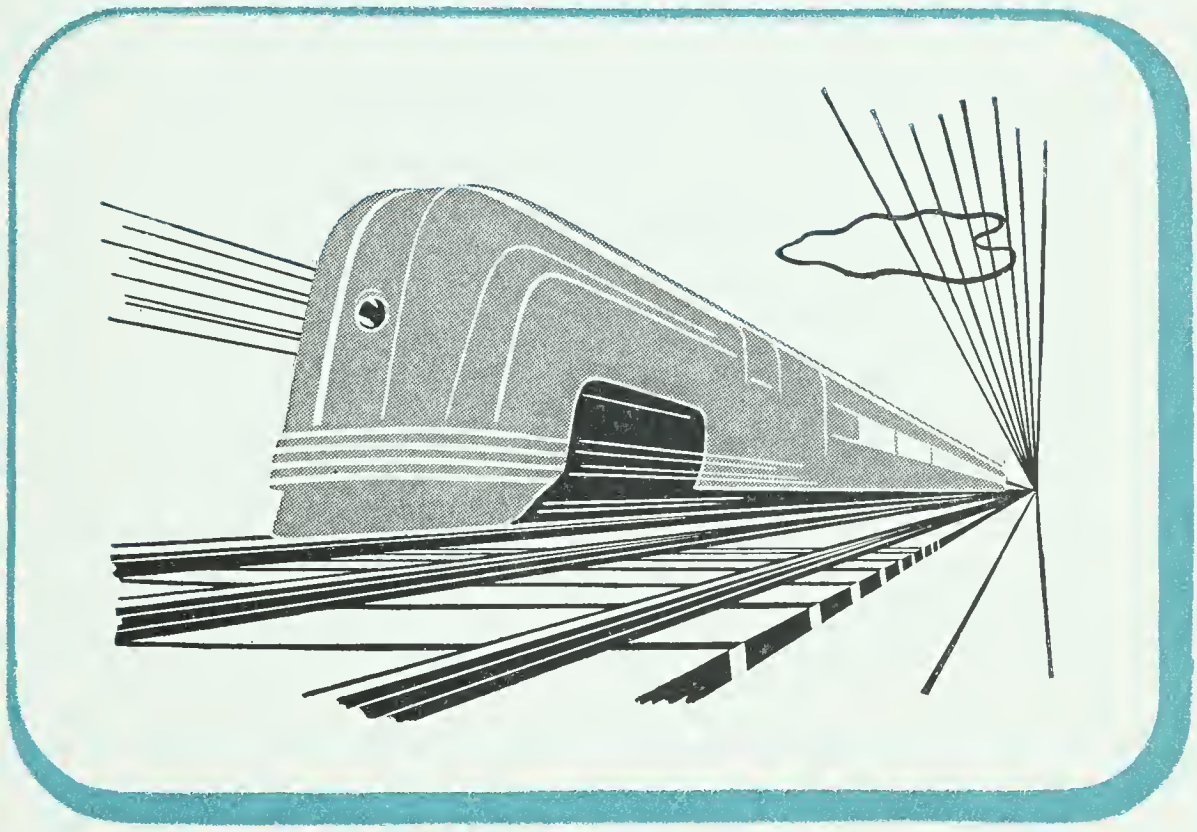
Through By Rail

THE Macmillan COMPANY

Through By Rail

BY

CHARLES GILBERT HALL



NEW YORK · 1938

The Macmillan Company

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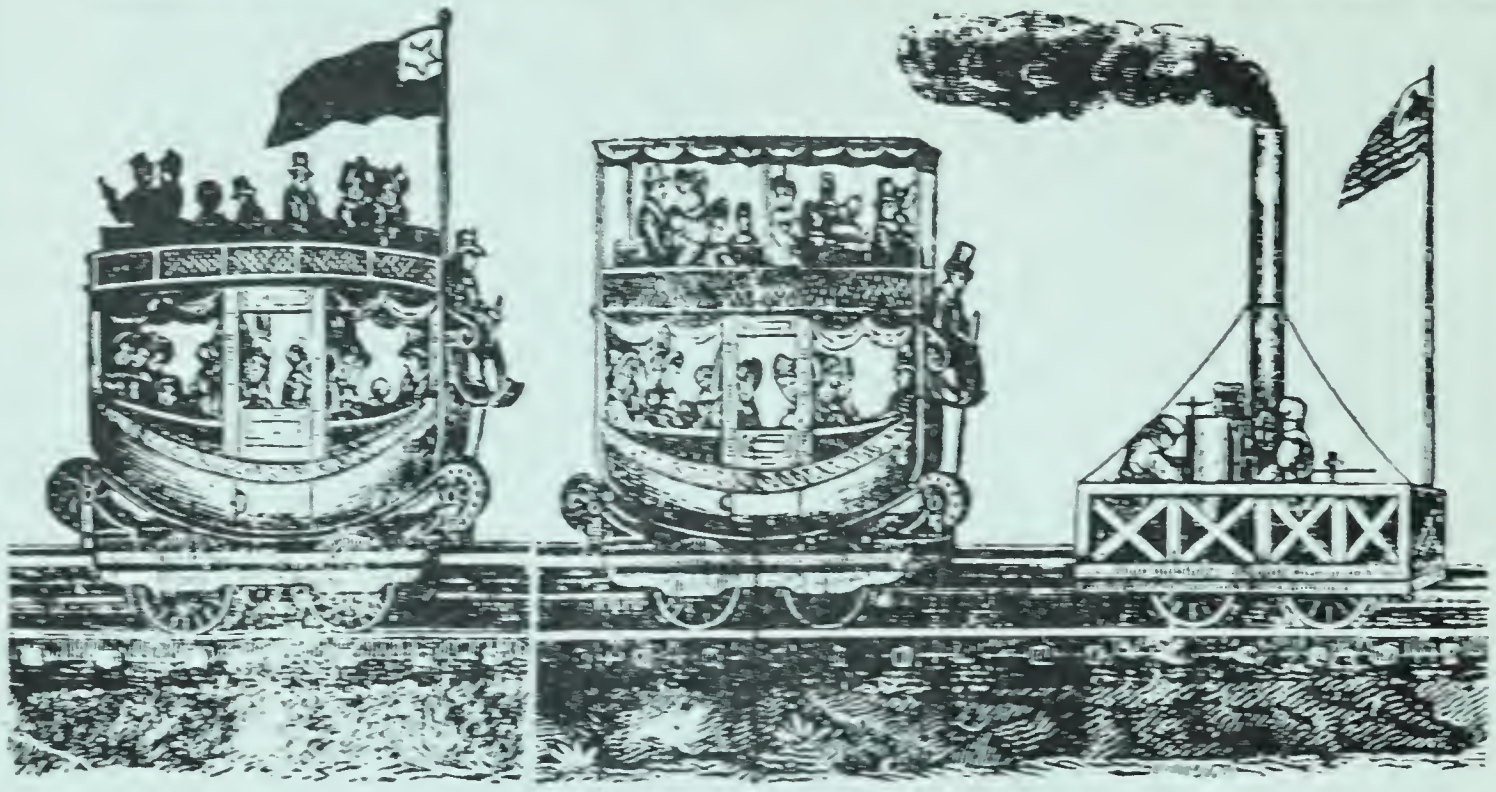
Their line is gone out through all the earth and their words to the end of the world.

—Psalms XIX:4

Contents

Through By Rail

NEWCASTLE AND FRENCHTOWN



RAIL-ROAD.

PASSENGER CARS,

PROPELLED BY A LOCOMOTIVE ENGINE,

Leaves the *Depot*, at NEW CASTLE, *for* FRENCHTOWN,

EVERY MORNING,

Upon the arrival of the Steam-boat from Philadelphia, at about

Half Past Eight o'clock,

RETURNING

Leaves Frenchtown at about Half-Past Ten o'clock.

ANOTHER TRAIN OF

PASSENGER CARS

Departs from New Castle, for Frenchtown, every evening, (except Sunday,) upon the arrival of the AFTERNOON BOAT, *from* Philadelphia, at about Six o'clock, and on return arrives about Nine o'clock.

Fare over the Road . . . . . 50 cents.
Do., for excursion over the road and back . . 50 cents.

R. H. BARR *Ag't.*

New Castle, June 1st, 1833.

1

The Silver Shilling and the Willow Wand

ONCE upon a time, when I was a little boy, my grandfather used to tell me that the Indians sometimes came to his father's house on their way to the great council meeting of the tribe. That was a hundred years ago, when there were still a good many Indians left. They were friendly Indians, and my grandfather and the other boys would gather round them in the long summer evenings and watch them shoot at a mark.

My grandfather's father would speak gravely to the Indian chief, and slowly getting up, would cut a willow wand and split it just far enough to slip a silver shilling into the crack, stick the wand upright in the soft turf, and let the young Indians shoot at it.

If you have never seen Indians shoot with the bow, you certainly have missed a treat. They would laugh and grow excited, just as white boys do, and the one who could knock the shilling out of the cleft could keep the money for his skill.

Next morning, bright and early, off the Indians would go, silent and grave, across the little river, and down the dark woodland paths. My grandfather and the other boys would sit around next day, and talk, and wonder, and wait for the Indians to come again.

Shillings weren't very plentiful and there weren't many places in which to spend them, so that neither the Indians nor the white men ever saw much money or had much need for it.

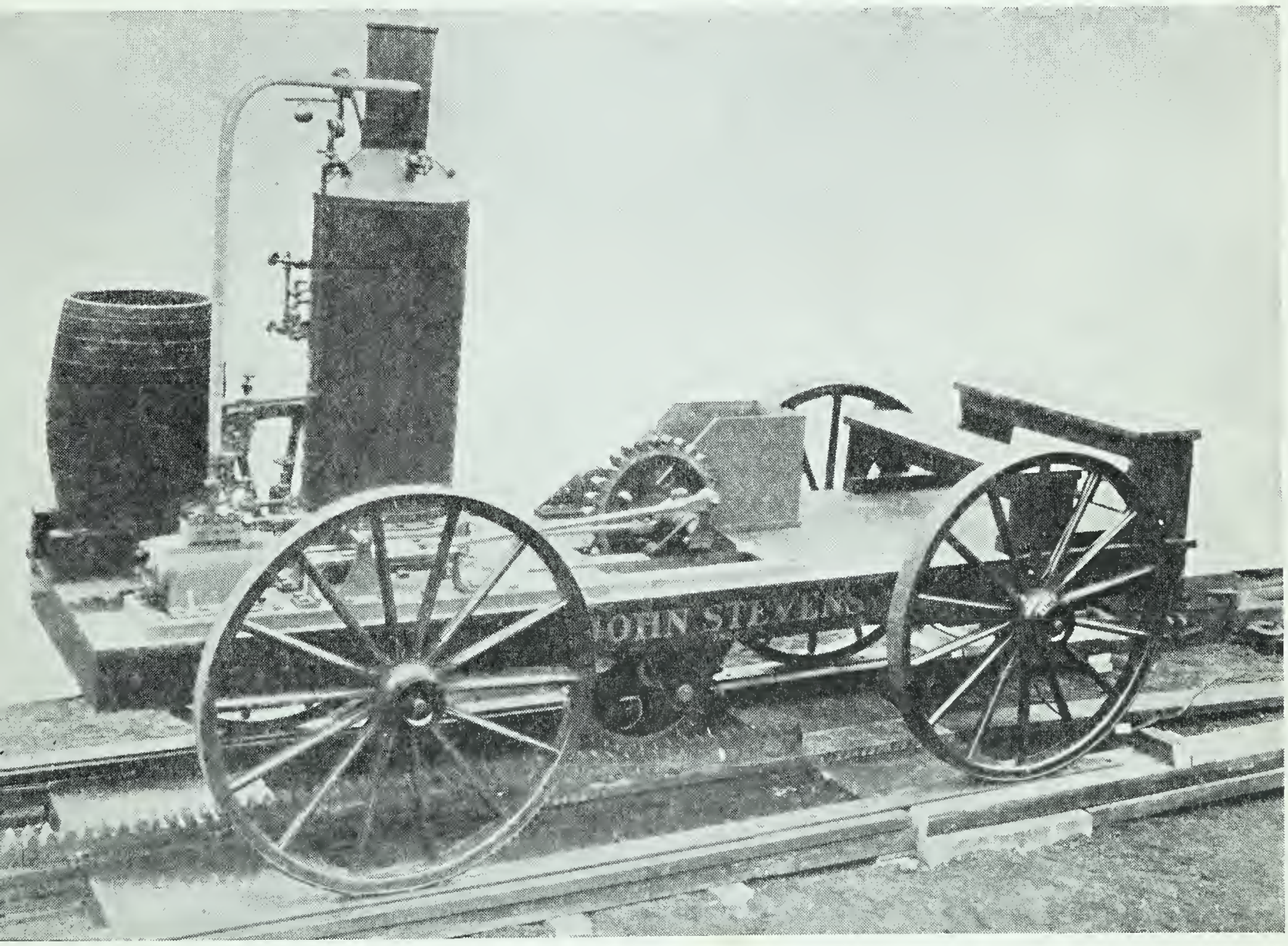
There weren't many places to go to, nor was there any very good way to get to them if there had been. There was a great deal of hard work, both for men and for boys. For amusement, you could hunt, or fish, or swim, or shoot at a willow wand, much as the Indians did.

To be sure, that wasn't all that the white people did. They had homes, and churches, and schools, and they lived differently from the Indians. But there was one thing that they wanted which they did not have! You will hardly be able to guess what it was. Money? They didn't need it very much, you know. They built their own houses, raised their own food, and spun and wove cloth from which they made their clothes; there really wasn't much that money could buy. Before the big fireplace, with the great logs crackling, with rosy apples roasting and nuts to eat, and with his old dog dreaming beside the blaze, what more could a boy ask?

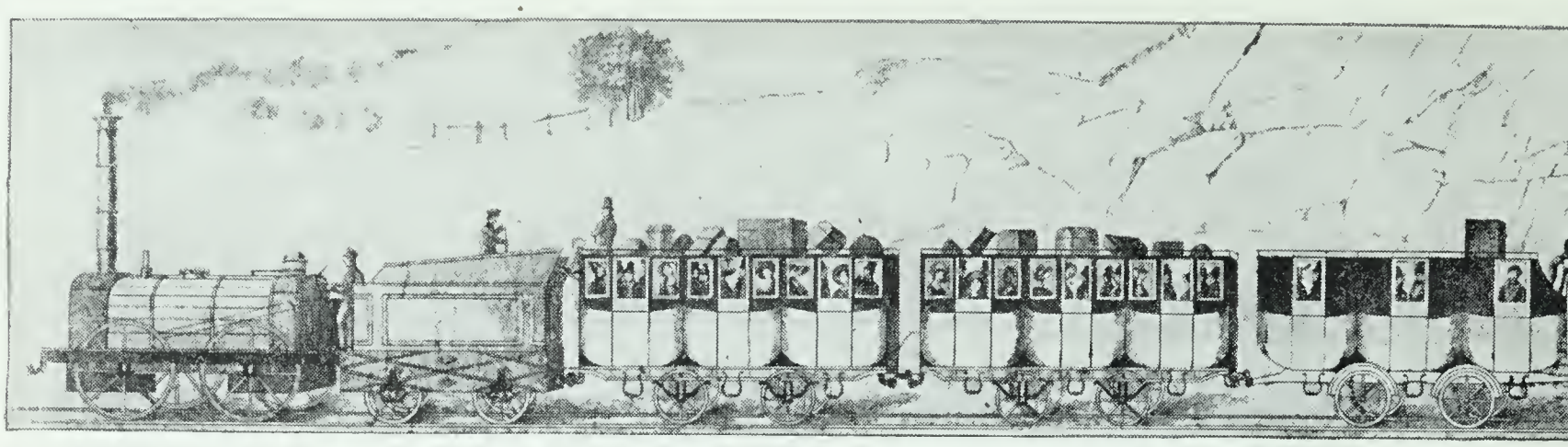
Well, there was one thing that everybody asked for and that was *roads!*

Today, when we have roads and pavements and railroads and automobiles everywhere, it is hard to understand how hungry these people were, a century ago, for good roads. It is hard to realize how shut in they felt from the rest of the world.

They couldn't sell their crops unless they had roads over which they could get to market. They couldn't buy anything unless they could get to the store. They couldn't get to the mill to grind their grain. They couldn't get their mail, or read their papers, or visit their friends. Still these restless settlers kept moving across the mountains. They forded



The John Stevens Locomotive of 1825



First Class Coaches in 1836

These cars still closely resembled the old stagecoach.

swollen rivers, pushed into the untrodden forest, and drove the sullen Indians before them.

Tough, hardened, and daring, they pushed ever a little farther west, crossing the mountains in their great covered wagons and building flat-bottomed boats in which to float down the western rivers to their new homes.

Then, in 1807, Robert Fulton built the steamboat, *Clermont;* and four years later the first steamboat on the Ohio River was launched. Soon the western rivers were dotted with these new vehicles of progress. The day of the Indian was done.

Steamboats were not of much use to you if you had taken up land that wasn't near a river, so the people began to build canals. The Erie Canal, between Albany and Buffalo, was opened in 1825, and ten years later thousands of miles of these waterways were being built.

Travel by canal was very slow, to be sure. In the early days if you missed your railroad train, you had to wait for another. But if you missed a canal boat, you had only to hurry down to the next bridge, toss your carpetbag down when the boat came along, and jump after it onto the upper deck. Dragged by two long-eared mules, the boats

Second Class Cars in 1836

Only first class passengers were provided with the protection of a roof

moved placidly, making possibly twenty or thirty miles a day. People thought this very fine. Some of the boats were faster than this, and were known as *packets.* These were passenger boats, very pleasant to ride upon. On the Erie Canal some of the packets were drawn by horses that trotted or galloped; on them the trip from Albany to Buffalo could be made in the unheard-of time of three days! Thousands of people traveled this way.

For a time, all this seemed quite wonderful; but the style of travel soon changed again. Over in England a man named George Stephenson had built what he called a *traveling engine.* It was what we now know as a *locomotive.* There was great excitement about it, for Stephenson insisted that this engine of his could run on a track of iron, and draw large loads of people or of freight at a speed and with an ease which prior to that time were unknown.

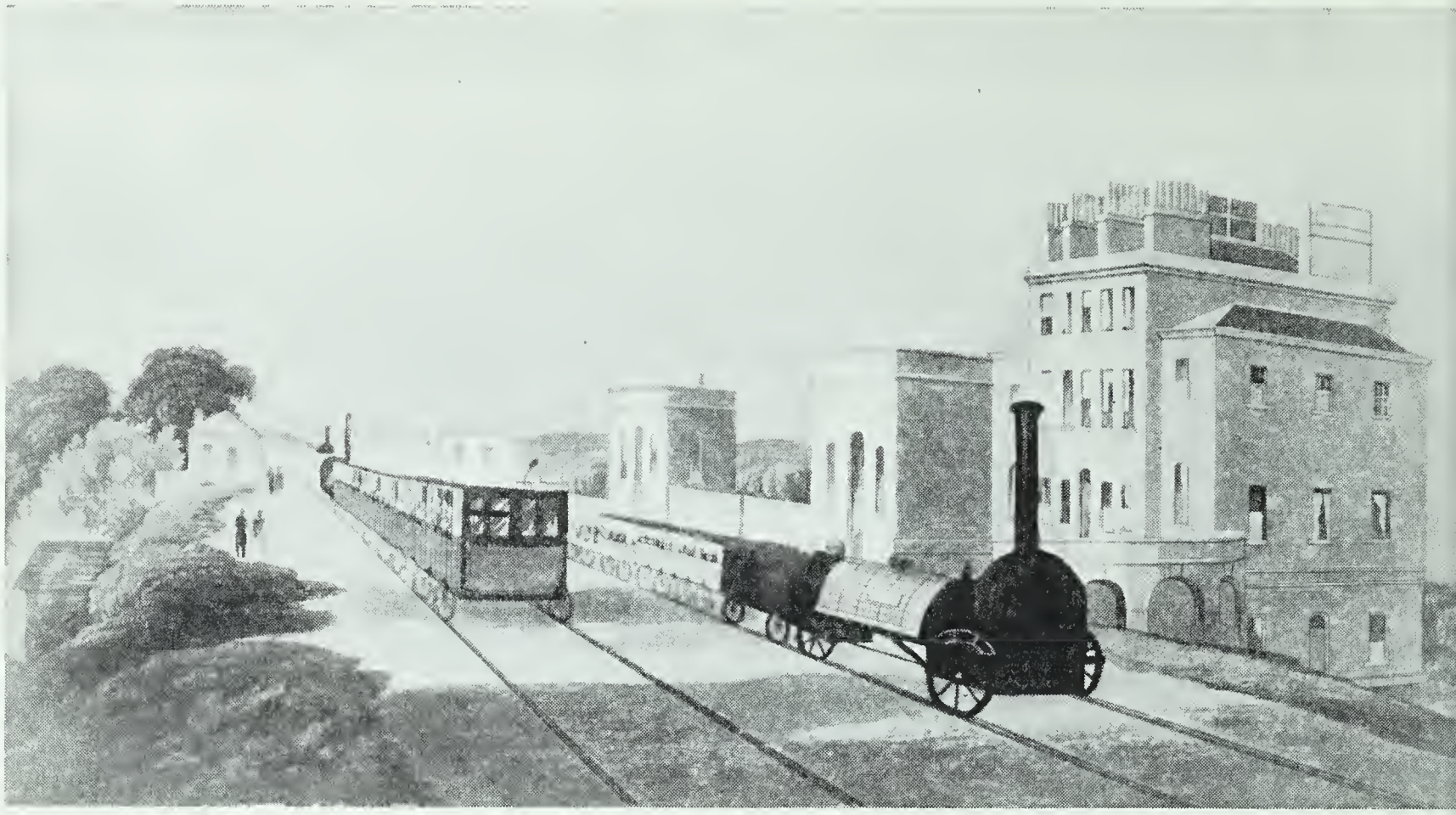
Very few people believed that this could be done. Yet in England, railroads were actually being built. They were causing much talk. In America, too, railroads were being talked about, although they were far from being popular.

2

Heigh Ho! Away They Go!

WHEN railroads were first talked about in America, the three principal eastern cities, Baltimore, Philadelphia, and New York, were much interested. This was not to be wondered at, for just at that time each of them was seeking a way to increase its western trade.

This was about 1830, and the Land of the Silver Shilling was filling up fast as the pioneers pushed their way into the wilderness. As they moved ever farther west, and in larger numbers, the settlers were calling back across the Alleghenies for badly needed supplies. They needed salt, sugar, coffee and tea, nails, hammers, axes, hoes—all the things required by settlers in a new country.



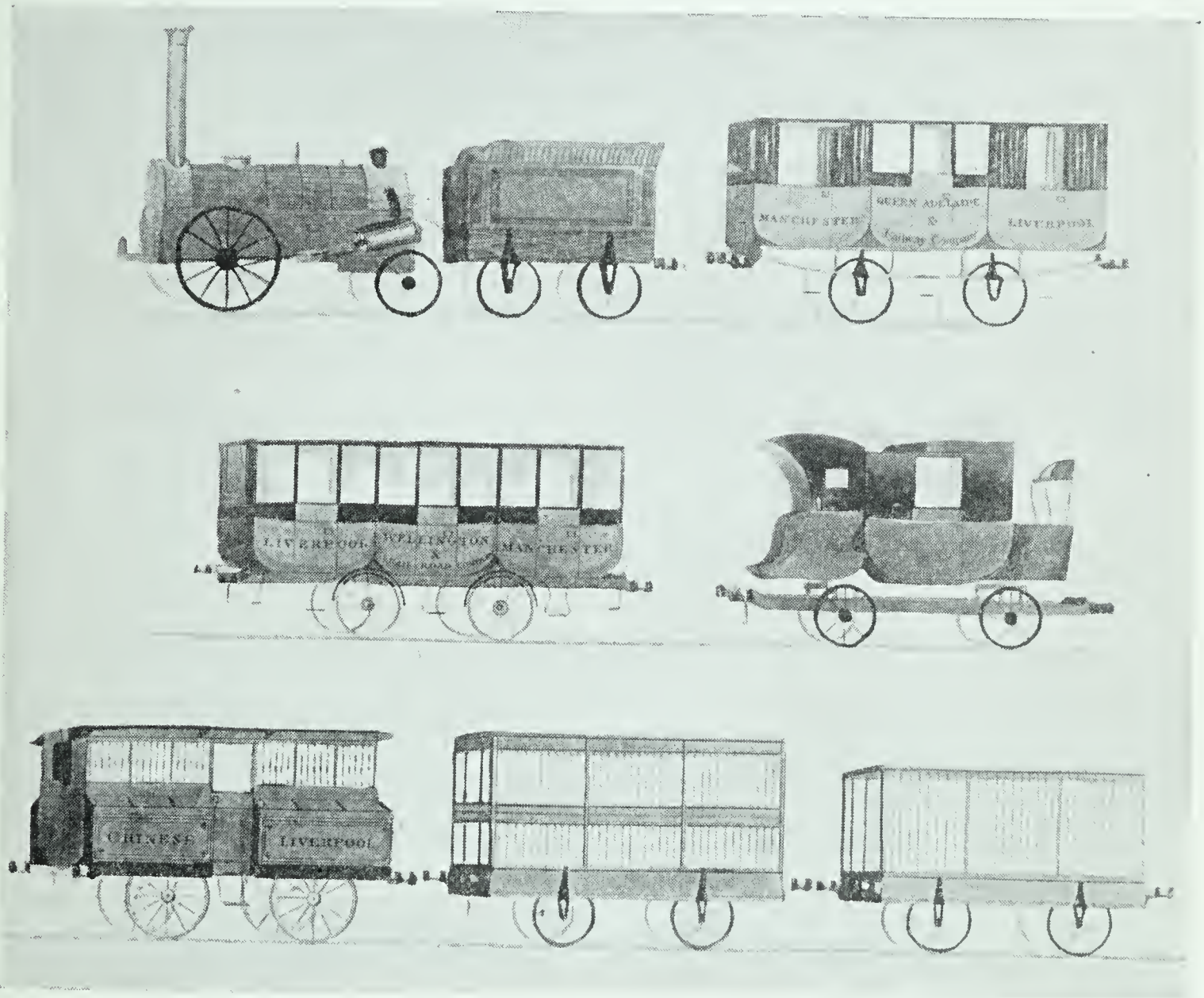
The London and Liverpool Railroad

It was no easy matter to get these things to them, for the way led over difficult mountains, along broken trails, and across the swollen floods of unbridged rivers. Few of the roads were good enough for wagons; many of the goods had to be carried much of the distance on the backs of packhorses. You can imagine how hard it would be for a train of pack animals loaded with sugar or salt or calico to ford swirling mountain streams day after day and not get their burdens wet! Nor was it easy to find food or lodging for either horses or drivers in a country where settlements were few and towns were far between.

Until 1825, New York had been sending goods up the Hudson in little sailing sloops, then west over the Mohawk Trail. Philadelphia had no water transportation that led westward; but she had built quite a good wagon road west as far as Lancaster, and it was soon crowded

with vehicles. Baltimore had a good road as far west as Cumberland, in western Maryland; and from Cumberland, in 1817, a road was built to Wheeling, West Virginia. It was known as the *National Pike.* Today it is still a beautiful and much-traveled road.

It was called the National Pike because it had been built by our National Government. When Ohio was admitted to statehood, in 1803, it was agreed between the newly formed state and Congress that for a period of five years after its sale none of the government land then



Stephenson's Railroad Trains, 1829

within Ohio's borders should be taxed. In return for this, Congress agreed to use five percent of the proceeds from its sales in building roads to aid settlers to reach the rapidly filling West. For this purpose the pike was built, extending eventually as far as Vandalia, Illinois.

It was a broad highway, eighty feet wide, with a paved central section thirty feet wide, built a foot deep with broken stone and covered with a surface of fine gravel. The streams were spanned by good stone bridges, many of which still stand. Stone mileposts marked off the miles.

Up and down the highway galloped stagecoaches loaded with passengers and running with relays of fresh horses day and night. Long caravans of Conestoga wagons moved slowly, piled high with freight. A Conestoga wagon was a great canvas-covered affair, with wheels sometimes as much as ten feet in diameter, and with a long bed that curved upward at either end. The horses wore clanking trace chains, harness that glittered with ornaments, and a heavy bear-skin cover over the hames. Between the hames hung tinkling silver bells. They were known as Conestoga wagons probably for the reason that the first ones were built at Lancaster, Pennsylvania, on the banks of Conestoga Creek.

One traveler reported that at one time he had counted twenty four-horse coaches on the road, and thirty six-horse freighters stabled in the tavern yard at night. You couldn't see a prettier sight than these great caravans. The wagons were gay with paint; their white covers gleamed far across the mountains; the six big horses, heavy with bright harness, filled the hills with the pleasant sound of their tinkling bells. Loaded with axes, nails, plows, sugar, coffee, tea—with jeans for Tommy's

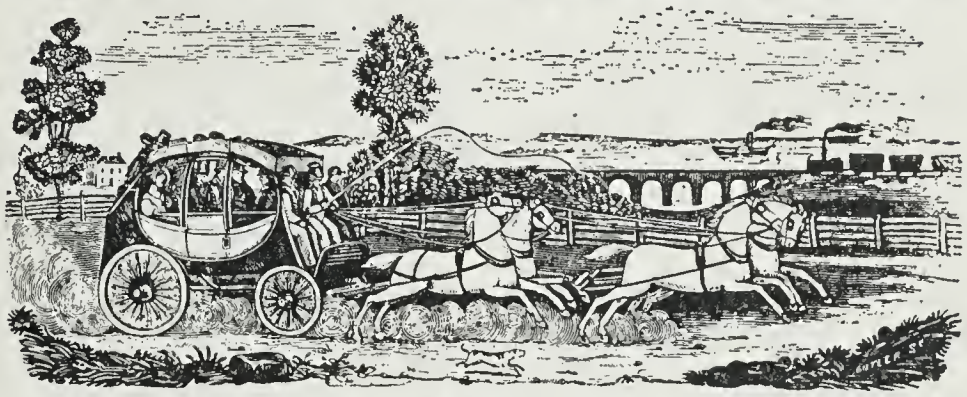
NEW ARRANGEMENT!

Daily Accommodation Line of Stages from

North Castle

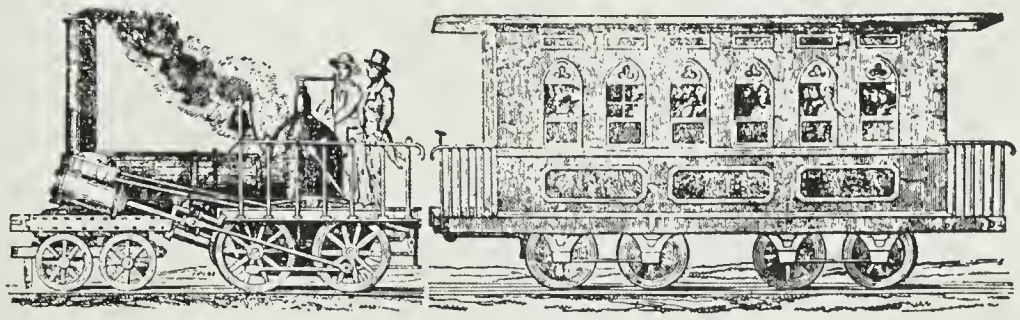
TO

PORT CHESTER.



IN CONNECTION WITH THE

New-York and New Haven R. R.



On and after Thursday, June 20th, 1850, a Stage will

LEAVE PORT CHESTER

On the arrival of the 4 o'clock Accommodation Afternoon Train from New-York, passing by the way of King Street, through to H. Finch's Store, North Castle.

LEAVE NORTH CASTLE

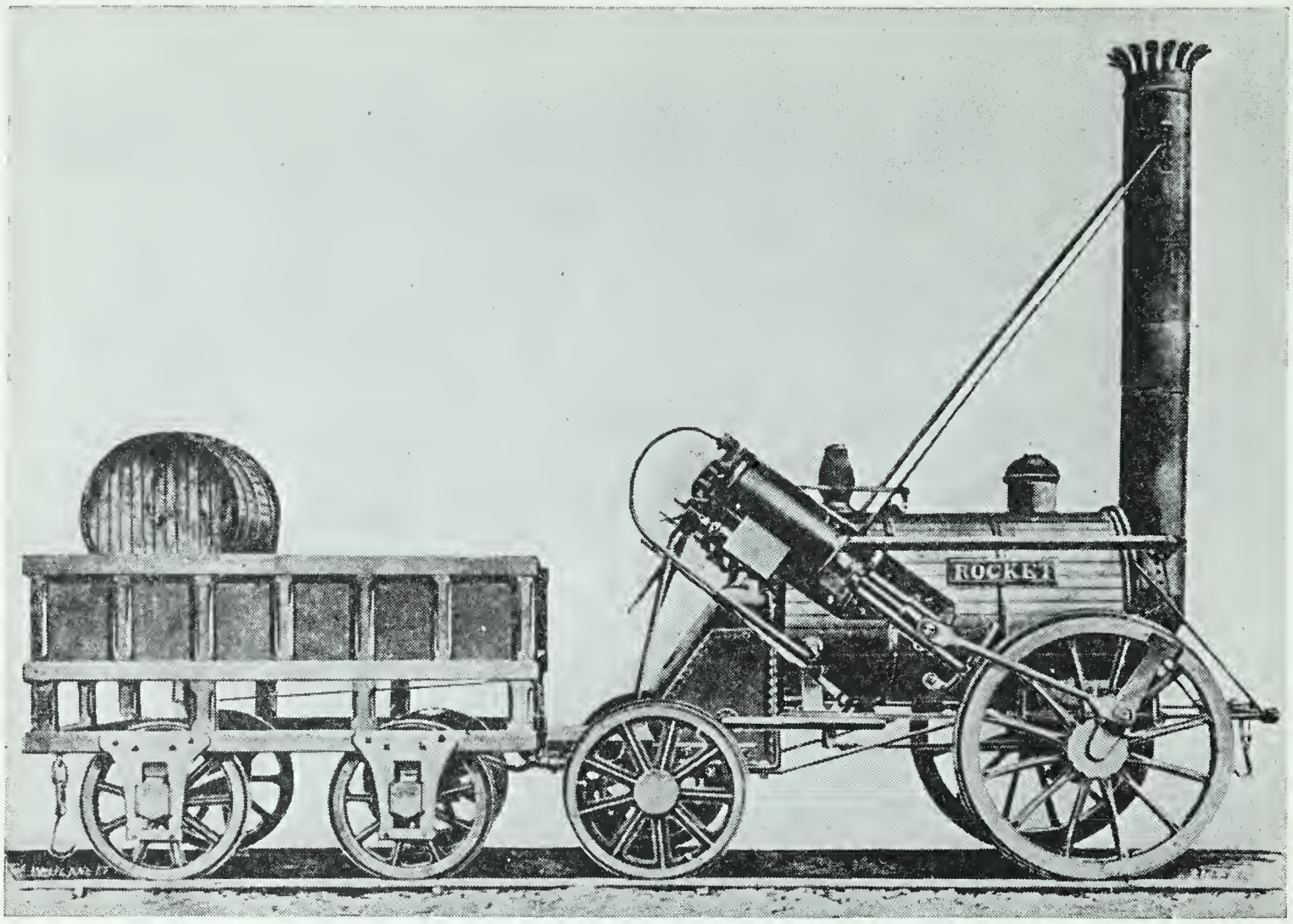
From H. Finch's Store at 3 o'clock in the Afternoon; Samuel P. Smith's Post Office, at 3¼, passing by the way of King Street; Glenville Corner, 4¼, in time to take the 6¼ Train to New-York.

Fare from Port Chester to North Castle, 37½ Cents.

HIRAM FINCH, Proprietor.

N. B— Passengers wishing to go to places adjoining this route, viz: Glenville, Purchase, Round Hill, Quaker Ridge, Mile Square, and Middle Patent, will be conveyed at reasonable rates.

Travel Advertisement in 1850



The Rocket

Sunday trousers and calico for little Nancy's frock, the big wheels rolled ever slowly westward.

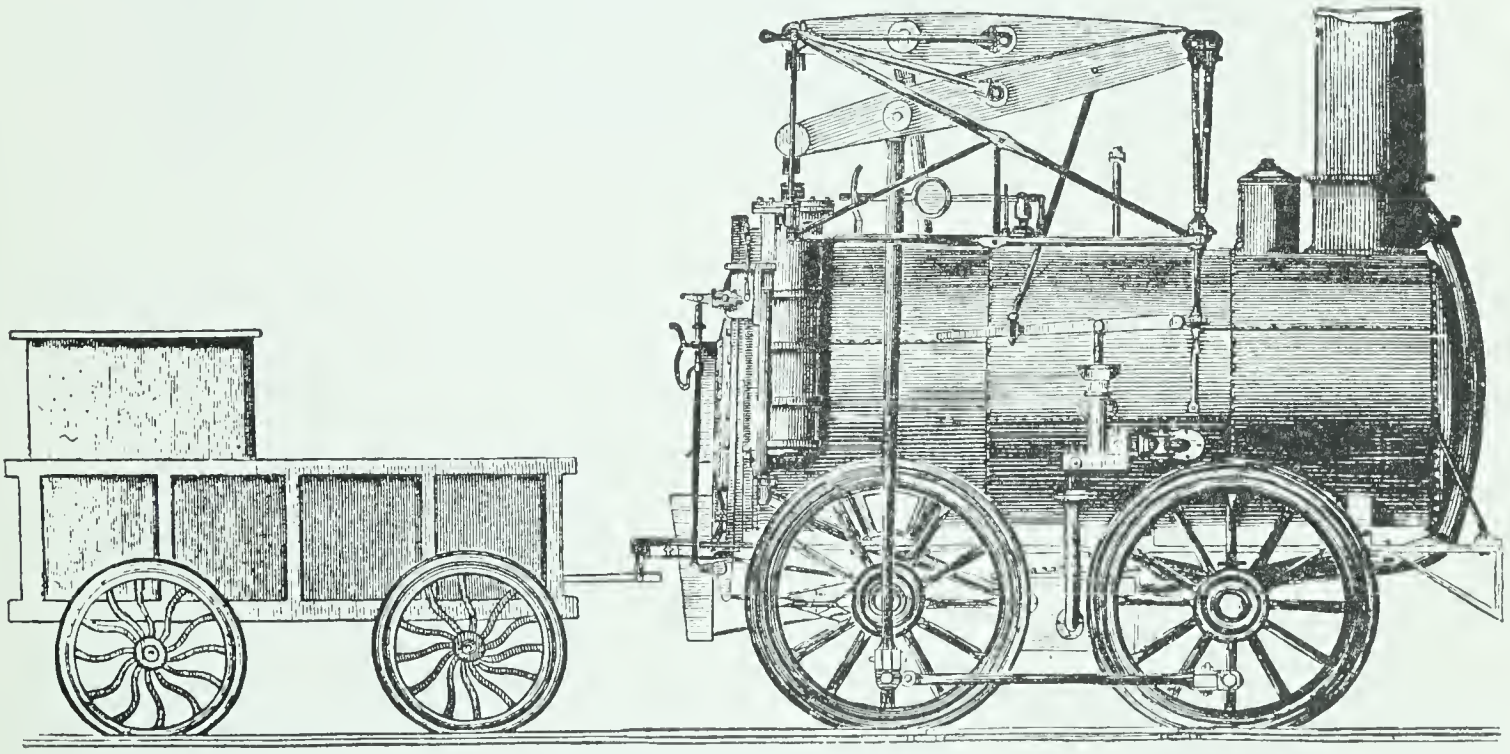
There was one great difficulty about all this; freight handled this way had to travel several hundred miles, and not only did this cost so much that the goods must be sold at a very high price when they reached the settlements, but it took a long time to deliver them.

Farther north, on what was known as the Mohawk Trail, freight was costing as much as a hundred dollars a ton, just to move it from Albany to Buffalo. When the Erie Canal was thrown open for business, this sum quickly fell to ten dollars a ton, then to three dollars and even less than that. The people in Philadelphia and Baltimore saw that

something must be done quickly if they were to hold their western trade. About this time they began to hear of the excitement in England over the question of railroads; they wondered if this brand-new means of travel wouldn't solve their problem. Four years after Stephenson had built the locomotive known as the *Rocket,* Baltimore built a railroad and ran the first railroad train in America.

Two years before that, in 1829, a locomotive had been brought to America; but it had not been a success. It was called the *Stourbridge Lion,* having been built in Stourbridge, England. It was brought for the purpose of hauling coal from the mines to the Delaware and Hudson Canal. The *Lion* ran three miles on its trial trip, proved to be too heavy for the light track on which it ran, was wrecked, and never ran again.

In Baltimore the people were not sure whether they wanted to risk running a locomotive on their new road. That sounds queer now; but



The Stourbridge Lion

at that time this was a very serious question. Many people believed that horses were the best motive power. A horse carried his own fuel. He didn't clank and roar. He didn't cost much, he didn't eat much, and he didn't scare people as a locomotive might do.

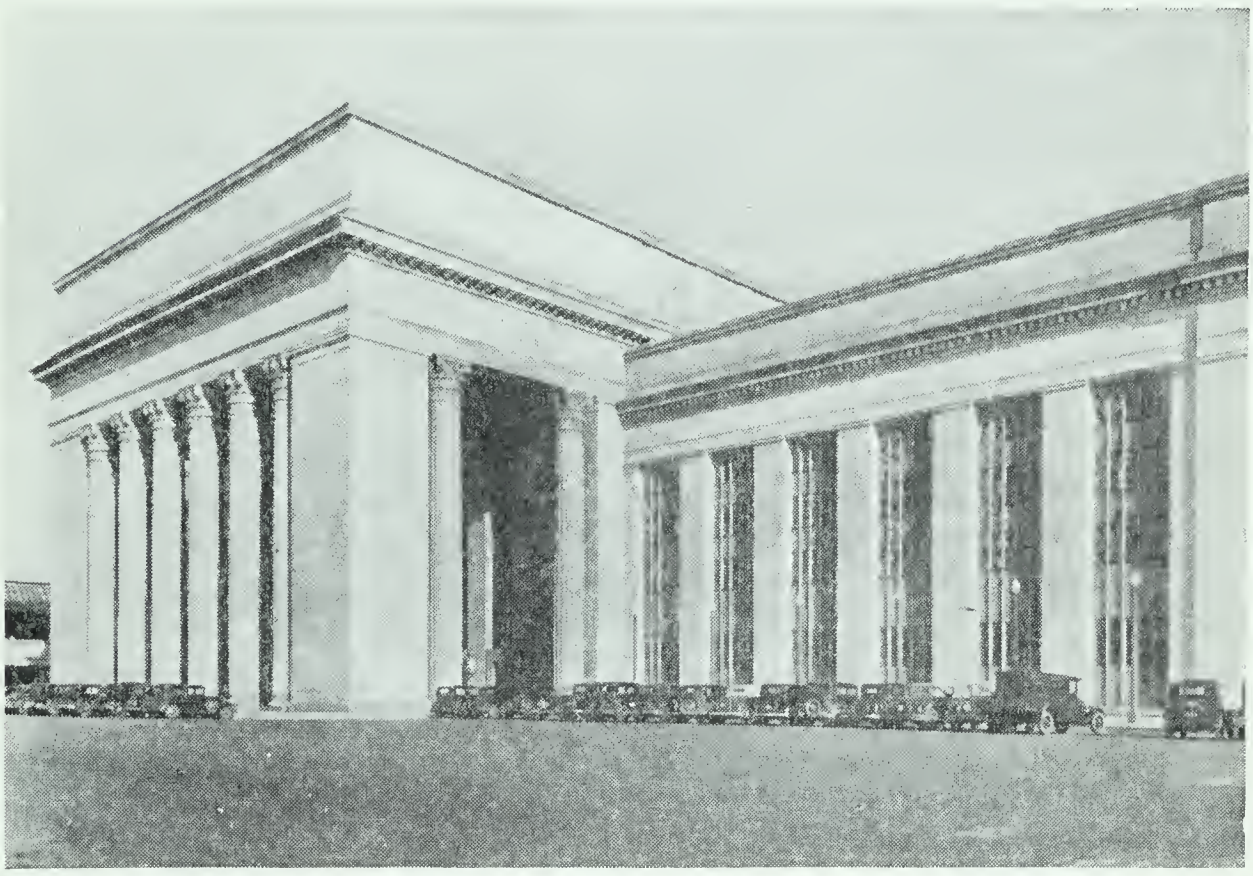
But the horse didn't work very well. Sometimes Dobbin would get off the track and upset the car to which he was attached. Sometimes the

Philadelphia's First Railroad Station

car ran onto his heels. Sometimes he stumbled and there was a wreck. So they unhitched him, and tried *sails*. A mast was hoisted, and a sail set; when the wind was right, off went the cars amid much fun. But the passengers found that they couldn't get back home unless the wind turned!

Then they tried dogs! Two dogs, harnessed to a light car, trotted off, with six passengers in tow. Very pleasant for a fun-making jaunt. But not very practical as a means of handling passengers and freight.

Meanwhile, a little locomotive which bore the name of *Tom Thumb* had been built. One fine summer day *Tom* was run out, and sturdy little fellow that he was, made the trip from Baltimore to Ellicott's Mills and back. It was the first journey ever made in America behind an engine carrying passengers. It was only thirteen miles to Ellicott's Mills, and a horse-drawn coach actually beat *Tom* in a race this first



Passenger Terminal, Philadelphia

trip. But it marked a new era in American history, for all that. In fact, it was a most remarkable performance!

The road from Baltimore to Ellicott's Mills was opened with great ceremony. Ground was broken on the Fourth of July, 1828, by the venerable Charles Carroll of Carrollton, then ninety-two years old and very proud of this, his last public act.

New York, not to be outdone, began to build a railroad west from Albany. With water transportation by way of the Hudson River, from

New York City to Albany, and from Buffalo west by the Great Lakes, this railroad would give the New York merchants the advantage over their competitors. They named their engine the *De Witt Clinton*, after their able and vigorous governor.

When the road had reached Schenectady, about fifteen miles west, *Little Black Nose*, as the engine was known to most people, made its first trip. Everyone turned out to see the fun, and all who could do so piled into the cars for a ride. Three stagecoaches had been mounted on wheels that fitted the rails. Behind the coaches four open flatcars were also crowded with people. When the train started, everybody held his breath. The tender was fastened to the engine with a three-foot chain; and the cars, one behind another, were fastened together in the same way. There was a sudden lunge; *Little Black Nose* leaped forward to the end of the chain. First, the tender started with a jerk that almost threw the fireman on his head. Then the front coach gave a leap that threw the passengers off their seats; and then the next coach, and the next, until amid laughter and loud good-bys the whole train was under way.

Then they stopped to take on water, for *Little Black Nose* couldn't go far without a drink. The engineer had an arrangement by which he could throw on a brake; but he wasn't very handy with it yet, so that the train stopped about as suddenly as it had gotten under way, and everyone was again jolted from his seat.

Meanwhile, many of the passengers had caught on fire. Smoke and cinders were a terrible nuisance in those days, for the engines burned wood for fuel and *Little Black Nose* was spouting smoke, sparks, and cinders all the way. Holes were burned in hats, coats, and gowns, and

when some of the passengers tried raising umbrellas, these, too, caught fire and were thrown from the moving train.

Along the way every farmer for miles around had loaded his family into a wagon and hurried over to see what it was all about. He drove as near the track as he could get, so that all could get a real good look. He hadn't much of an idea what a railroad train would be like, and his horses had even less. So when *Little Black Nose* came into view, roaring defiance and spitting fire and smoke, there was a clatter and scatter and crying of "Whoa!" and "Hold up there!" such as had never been heard in the Mohawk Valley before.

A most interesting and valuable record of this historic travel holiday has been left to us. In those days no one yet knew how to make photographs. But there were men traveling around the country who had very skillful hands, and who, with a keen little pair of scissors, could cut portraits from a piece of black paper. Very excellent portraits they often were, much like one's shadow on a curtain. They were known as *silhouettes.*

One of these men, a Mr. Brown, was in Albany on that day. He caught the importance of the occasion, hastily drew an old letter from his pocket, and on it made a careful sketch of the train and the people it carried. Then he scrambled aboard and made the trip. Later, with his deft scissors, he cut a picture from black paper so perfectly that people could recognize their friends among the passengers.

From the small beginning with *Little Black Nose,* which the silhouette pictured, sprang the great railway system now connecting the East and the West, just as similar beginnings at Baltimore and Philadelphia have grown into networks of railways.

NEWBURYPORT RAILROAD.

CONNECTING

Newburyport with Boston,

Haverhill with Boston,

Danvers and Salem.

CONNECTING

Newburyport with Haverhill,

Lawrence, Lowell,

Manchester, Concord & the

North.

STATION IN BOSTON---Boston and Maine R. R. Station, Haymarket Square.
" NEWBURYPORT---Head of State Street.
" BRADFORD---Haverhill Bridge.

FALL AND WINTER ARRANGEMENT.

On and after MONDAY, November 1st, 1858, Trains

FOR BOSTON,

		*†		*†	
Leave	NEWBURYPORT,	7.45,	11.00 A.M.,	4.10	P.M.
"	BYFIELD,	7.58,	11.12 "	4.23	"
"	HAVERHILL & BRADFORD,	7.50,	11.05 "	4.15	"
"	GROVELAND,	7.55,	11.13 "	4.23	"
"	GEORGETOWN,	8.06,	11.20 "	4.30	"
"	BOXFORD,	8.14,	11.29 "	4.38	"
"	TOPSFIELD,	8.20,	11.35 "	4.45	"
"	PUTNAMVILLE,	8.31,	11.45 "	4.55	"
"	DANVERS,	8.35,	11.50 "	5.00	"
Arr. at	BOSTON,	9.28,	12.40 "	5.54	"

*Express from South Reading. †For Lowell.

FROM BOSTON,

		*		*	
Leave	BOSTON,	8.00	A.M.,	2.00, 4.30	P.M.
"	DANVERS,	8.55	"	2.50, 5.25	"
"	PUTNAMVILLE,	9.00	"	2.55, 5.30	"
"	TOPSFIELD,	9.10	"	3.05, 5.30	"
"	BOXFORD,	9.15	"	3.10, 5.45	"
"	GEORGETOWN,	9.25	"	3.20, 5.55	"
"	GROVELAND,	9.32	"	3.27, 6.02	"
"	BYFIELD,	9.32	"	3.27, 6.02	"
Arr. at	HAVERHILL & BRADFORD,	9.40	"	3.35, 6.09	"
"	NEWBURYPORT,	9.45	"	3.40, 6.15	"

*Express to South Reading.

The first train from Haverhill and Newburyport connects directly at West Danvers with Salem & Lowell Railroad for Salem. Train leaves Salem (Court House Station) for Newburyport and Haverhill at 4.50 P. M.

COACHES leave Danvers on arrival of 11.00 A. M. and 4.10 P. M. Trains from Newburyport, for Danversport and Salem.

COACHES leave Salem for Danvers, connecting with trains for Newburyport and Haverhill.

FREIGHT TRAINS will run daily each way between Boston, Newburyport, Haverhill and Bradford Junction, connecting at Bradford Junction with Freight Trains for and from the North and East, and at West Danvers with Freight Trains for and from Salem.

FREIGHT DEPOT IN BOSTON ON HAVERHILL STREET.

Merchandise from Boston by this route should be marked and directed *via Newburyport Railroad*, or *via Georgetown*.

NEWBURYPORT AND BRADFORD JUNCTION TRAINS.

FROM NEWBURYPORT.

Leave	NEWBURYPORT,	7.45, 11.00	A.M.,	4.10 P.M.
"	BYFIELD,	7.58, 11.12	"	4.23 "
"	GEORGETOWN,	8.06, 11.20	"	4.30 "
"	GROVELAND,	8.15, 11.29	"	5.39 "
"	HAVERH'L Bridge,	8.23, 11.37	"	4.45 "
Arr. at	BRADFORD Junc.	8.26, 11.40	"	4.48 "

FOR NEWBURYPORT.

Leave	BRADFORD Junc.	9.05	A.M.,	3.00, 5.35 P.M.
"	HAVERH'L Bridge,	9.10	"	3.05, 5.37 "
"	GROVELAND,	9.15	"	3.10, 5.42 "
"	GEORGETOWN,	9.25	"	3.20, 5.55 "
"	BYFIELD,	9.32	"	3.27, 6.03 "
Arr. at	NEWBURYPORT,	9.45	"	3.40, 6.15 "

TRAINS CONNECT AT BRADFORD JUNCTION AS FOLLOWS:

☞ **The 11.00 A. M. train from Newburyport connects with trains for Lawrence, Lowell, Manchester,** Concord and the North. The train which leaves Lowell at 7.30 A. M., connects with trains for Newburyport. The first train from the East connects with trains for Newburyport.

GEORGETOWN AND BRADFORD TRAINS.

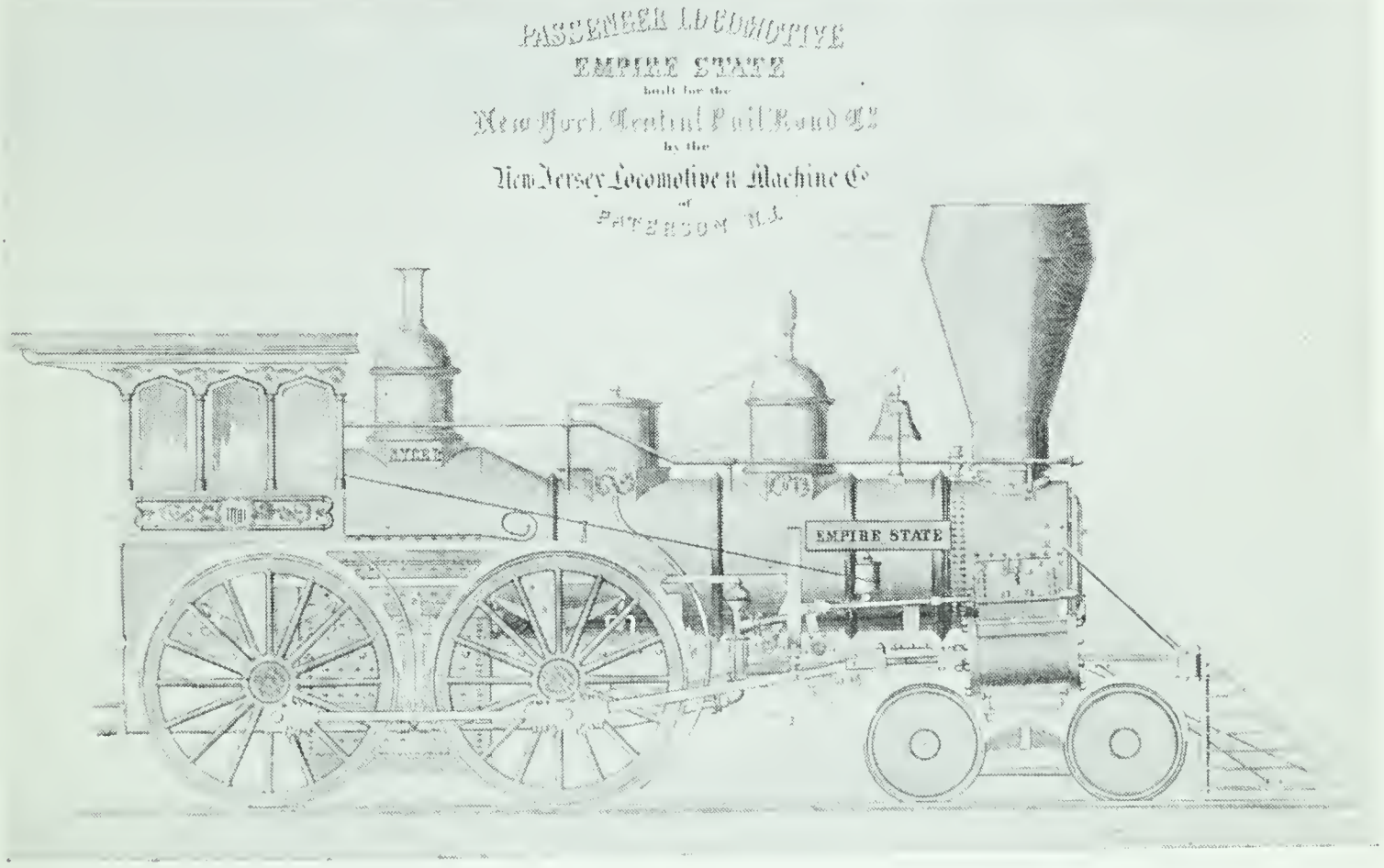
Leave GEORGETOWN 8.06, 9.25, 11.20 A.M.; 3.20, 4.30, 5.55 P.M. Leave BRADFORD 7.50, 9.05, 11.05 A.M.; 3.00, 4.15, 5.35 P.M.

WM. H. HUSE & CO., PRINTERS, 3 STATE STREET, NEWBURYPORT.

B. POOLE, President.

A Timetable Eighty Years Ago

This growth was by no means speedy. At first no less than seven little railroads were built to cover the distance between Buffalo and Albany. On these, seven changes of cars had to be made, for no two of the roads were built to the same gauge, that is, the same distance between rails. Thus the tavern keepers and merchants at each junction point made money from the sums spent by travelers between trains. Often the schedules were so arranged that a whole day or night had to be spent in a town whose merchants had a working agreement with the railroad officials. When this handicap was finally overcome, trains ran through, as they do today, not only from Albany to Buffalo, but from New York City and Boston to practically all the great cities east of the Mississippi River.



A Locomotive of 1860

3

How Philadelphia Started West

THE two railroads at Baltimore and at Schenectady were quite short. At Baltimore, in 1831, the road was only thirteen miles long. At Schenectady, *Little Black Nose* had only about fifteen miles of track. There was also a short road at Boston.

At Charleston, in South Carolina, there was a road on which the locomotive was called the *West Point*. This railroad paid careful attention to the timidity shown by passengers who were about to risk their lives by taking a railroad trip. Next to the engine a car was carried loaded with bales of cotton. Then came an open car carrying a negro brass band. The white passengers, in comparative safety, rode in the

last car, as far as possible from the locomotive in case it should explode. In 1833, this road extended from Charleston west, about one hundred and forty miles, to the Savannah River, opposite the city of Augusta. *It was then the longest railroad in the world!*

Philadelphia was greatly interested; its citizens talked a good deal about building a road to the West from their city, to protect their trade.

Building the Union Pacific Railroad

There was a jeweler in Philadelphia at that time, Matthias Baldwin, who had built a little engine for a friend of his. This friend exhibited it in a museum to interested visitors; he used it much as we use toy trains today in our amusement parks. It attracted much attention. When Philadelphia finally decided, in 1833, to build a railroad, Baldwin was asked to construct an engine for it.

It had now been several years since Stephenson had built the *Rocket*

and run it between Liverpool and Manchester amid a storm of abuse. But the dislike of railroads was not yet dead. Men grew angry when they talked about them. No one could ride behind such a monster! They said it would go so fast that it would take one's breath away; it would shake the earth so that crops would no longer grow; the hens would stop laying eggs; and the cows would be so scared that they would no longer give milk. It was said, too, that the road would have to build a station every five or six miles at which water for the engine could be boiled. For cold water would kill the steam and force the engine to stop.

In England, the Duke of Cleveland, a rich nobleman, kept Stephenson from building a road for several years, claiming that the engines would spoil his fox hunting and scare his pheasants. In America, however, the towns were so far apart, the country was so new, and the need for railroads was so great, that the opposition to them was not very strong. Besides, in England it was found that while people argued about them, trains were actually running, the hens kept right on laying, the cows gave milk just as usual, and the crops continued to grow. This being the case, the people at Philadelphia continued to plan on how to keep their western markets, and after much discussion decided to go ahead and build their road.

The first engine that Matthias Baldwin built for the Philadelphia road was christened *Old Ironsides.* It wasn't much of a success. For one thing, *Old Ironsides* wasn't heavy enough to stick to the rails when a load was placed behind it, and Mr. Baldwin and his helpers had to run along and push whenever the engine stalled, then clamber on and ride until it began to slip again.

That didn't discourage Mr. Baldwin. He kept right on, and in two years more he had built an engine that ran *a mile a minute!* This was a speed such as had never been dreamed of at that time. Nor did he stop at that. He became greatly interested in this new problem of transportation by steam. Giving up the jeweler's trade, he began to build locomotives. Today the Baldwin Locomotive Works builds engines for railroads in every part of the world.

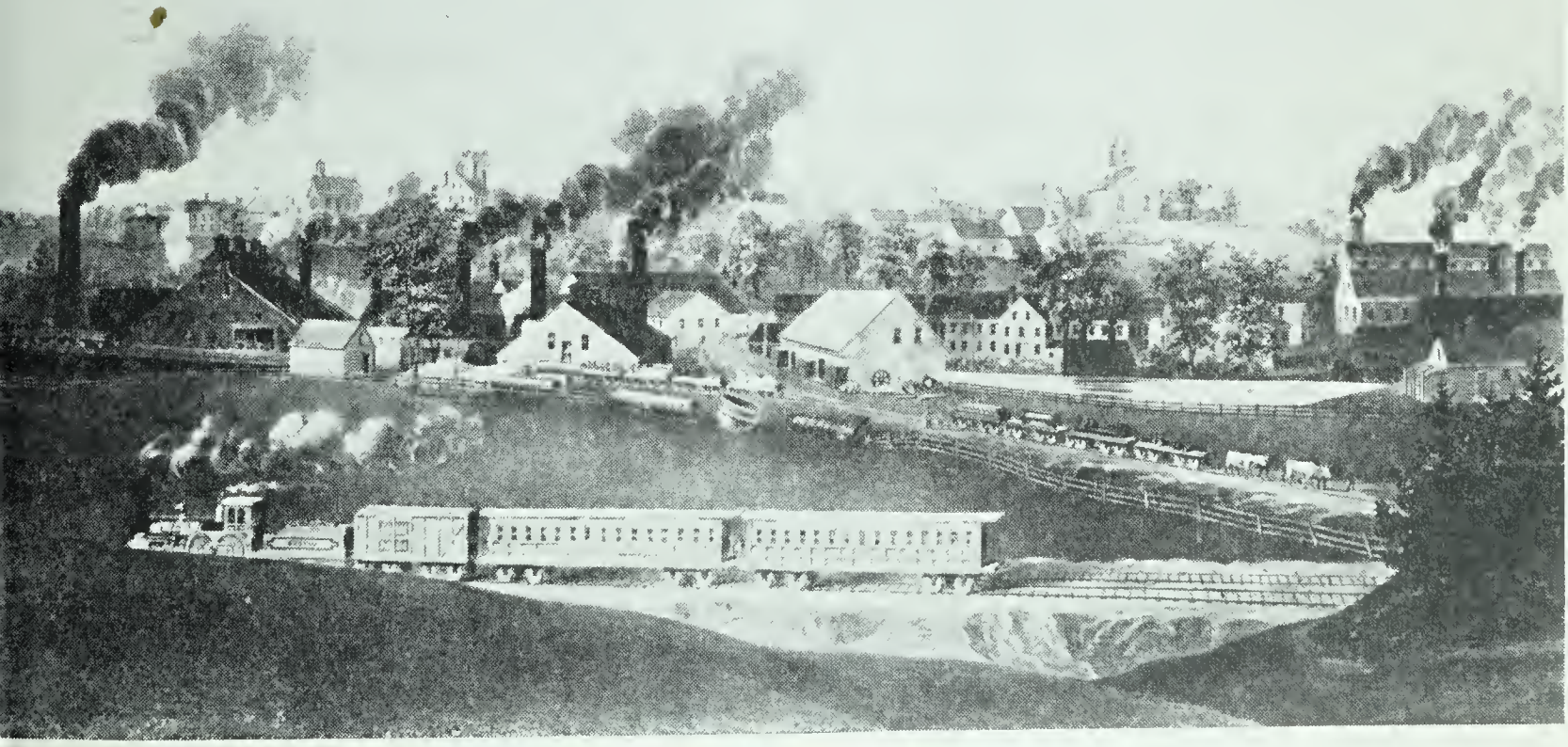
Another famous engine of these early days was the *John Bull.* This engine ran on the Camden & Amboy R.R., from Camden, on the Delaware River, to a point near Elizabeth, N. J., opposite New York City. After running many years, the engine was placed on exhibition at the Centennial Exposition, in Philadelphia. Later, in 1893, it drew a train to Chicago, under its own steam, carried over 50,000 passengers at the World's Fair grounds, and steamed back to Washington, where it remains today.

By 1834 the Philadelphians had built some eighty miles of railroad across rich and fertile country, straight for the Allegheny Mountains. No one yet knew how a railroad could cross a mountain; so when the tracks reached the Susquehanna River, further construction stopped.

At the town of Columbia canalboats awaited the passengers and carried them by way of the Pennsylvania Canal to the present town of Hollidaysburg. At Hollidaysburg two broad-gauge railroad tracks ran straight up the side of the mountain, with a big endless cable up the middle of one track, down the middle of the other, and around a great wooden windlass at each end. At the base of this incline, the canalboats were run onto large cars, and car, boat, passengers, and all were whirled up the mountainside, to the passengers' great astonish-

ment. It took five such inclines, one above another, to reach the summit; and five more to get down on the other side.

There has been a great change along the Susquehanna since canal-boats ran up the canal to be drawn up the mountainside on inclined planes. Today the railroad crosses the mountains on four great tracks so quickly that the traveler hardly realizes that the mountains are there. But in those days, at the foot of the western slope the boats were launched on another canal and towed down to the little frontier city of Pittsburgh. Look on the map, and you will see how important Pitts-



A New England Manufacturing Town, 1850

burgh was. Here the travelers came to the Ohio; and from here they could float down that stream to many parts of the West.

At Pittsburgh they could outfit themselves, buy or build a flatboat or keelboat in which to drop down the river, or wait for friends or other adventurers before continuing their journey. Most settlers finally reached their new homes either by water or by slow-moving wagon train.

Railroads, it soon became evident, were now here to stay. The road from Baltimore was now building steadily westward; up at Albany it soon became possible to ride all the way to Buffalo by rail. At Buffalo the *Walk-on-the-Water*, the first steam-driven vessel on the Great Lakes, was carrying people to Cleveland and Detroit. Settlers were thronging into the West by thousands; schools and churches were becoming plentiful; and men were setting up a system of law and order.

Look at a map of America that shows the United States as it was at that time! Texas, Utah, Nevada, Arizona, New Mexico, and part of Colorado were all foreign soil. Oregon, Washington, Idaho and part of Montana were in dispute. We had nothing west of the Rocky Mountains that we could call our own! Spain, Great Britain, Mexico, France —all of them ruled parts of what is now our land. We had only twenty-four states then. We have twice that many now. We had only twelve million people then; now we have about a hundred and thirty million. No wonder the old map looks strange!

In a beautiful inland city a few years since a traveler drove down the shady street and stopped at a handsome little hotel. He was puzzled by its name. It was called *The Four Flags*.

"What a strange name for a hotel," the traveler said. "Where do

you get the idea of the four flags? Here you are, a thousand miles from the sea, sheltered and peaceful and far from all flags but our own."

"Why," said a bystander, "you don't seem to know your history. France once owned all this country about here; Great Britain, too, ruled here once upon a time; before that Spain claimed every foot of the land. Looks pretty quiet around here now. But this once was part of Europe's fighting ground. That's why we call the hotel *The Four Flags.*"

Now the little city with its shady streets and happy people is busy and peaceful and a part of our one great country, largely because we can get from one part of it to another with ease. No wonder people, in 1834, went wild with enthusiasm as they hurried westward over the new railroads, and as the Indians who had shot at the silver shilling were driven steadily farther west.

4

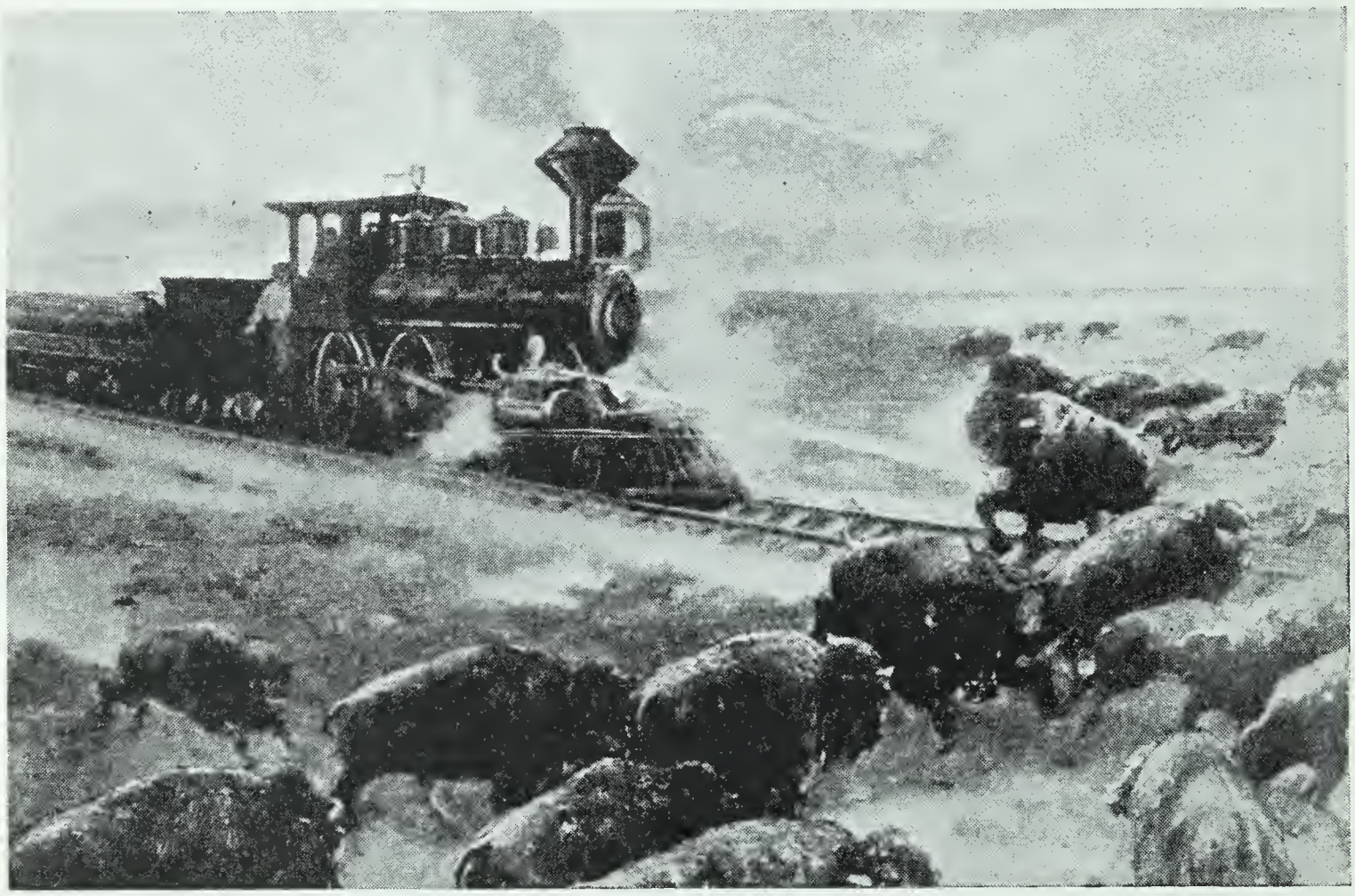
Carrying Coals to Newcastle

ALL this building of railroads a hundred years ago was due to the foresight and ingenuity of one boy. If it hadn't been for George Stephenson and his ability to hang on when there seemed nothing left to hang on to, we might have had no railroads, and America would have grown into a great nation much more slowly. We might even still be living in the days of the silver shilling and the willow wand.

Stephenson was a Northumbrian boy, born and raised just outside the city of Newcastle, in the northern part of England. When you have started out to do something that wasn't necessary, has someone ever told you that you were *carrying coals to Newcastle?* That means that

Newcastle, a town upon the River Tyne, is already well supplied with coal, coal boats, coal mines, and coal merchants; that all the country around Newcastle is full of coal mines; and that you are taking time and trouble to do something for which there is no good reason.

Once, however, carrying coals to Newcastle had been quite a problem. When the coal had been mined and lifted to the surface it still had to be carried to Tynemouth and loaded into the ships that lay waiting in the River Tyne. This was, in many cases, as much as two or three miles away. Various ways to get the coal to the ship's side were tried, but none of them worked very well, for the reason that the miners still kept on mining coal faster than it could be carried to the ships. The mine owners tried to do it with horses and wagons, but this



A Startled Herd of Bison

was too slow and expensive. Then wooden tracks, called *tramways*, were laid. The wagons ran much more easily on these, and the teams could draw much larger loads. But the wooden tracks wore out very quickly. Finally someone began laying strips of strap-iron on top the wooden rails. It was all very slow and expensive, while at the mines the coal kept coming to the surface faster than it could be hauled away.

Steam engines were then being used to pump water from the mines; it was felt that if steam could also be used to haul the coal, it would be a wonderful improvement. But no one believed for a moment that such a thing could be possible. If anyone tried it, people said, the wheels simply would slip on the smooth track, and then where were you? The load would be pulling the engine, instead of the engine pulling the load. A horse could dig his toes in and get a good hold. But who ever heard of an engine that had toes?

Then someone had a great idea! *He put teeth in the wheels!* Thus he provided his engines with at least one feature in common with the horse. These teeth we now call *cogs*. They were on an extra wheel that fitted into the cogs in the upper surface of a rail laid in the center of the track. But somehow the idea didn't seem to work. The engine was so busy fitting the teeth on the wheels into the spaces between the teeth on the rail, that little or no strength was left for pulling the load.

It was George Stephenson who had the courage and the mechanical genius to change all this. No story of railroads would be complete without this story of the boy from Newcastle who, come high come low, persisted in showing the world that people and freight could be moved more quickly and cheaply by the power of steam than by any other means man had known up to that time.

Stephenson had worked with steam all his life. As a boy of eleven he had helped his father, who was the assistant engineer, on the steam pumps at the mines. In fact, he was such a small boy that he had to hide when the mine owner came round, so that it might not be seen how small he was. Even before that, looking after his younger brothers and sisters in the roadway before their door, the boy had watched the patient horses that drew the great wagons of coal over the wooden tramway that passed along the Wylam High Road, on which they lived. As he watched, his love of machines taught him to fashion small steam engines of sticks and clay, and to dream of the day when he might work with engines that were real.

Being a born mechanic, no sooner had the boy taken the job at the mines than he began to take the engine apart, clean it, and put it together again, so that he soon knew more about how it was built and how it worked than anyone else at the mine. This fact soon became noised about; as the years passed, he found himself known as what might be called an expert, and called upon to repair mine engines everywhere in the vicinity of Newcastle.

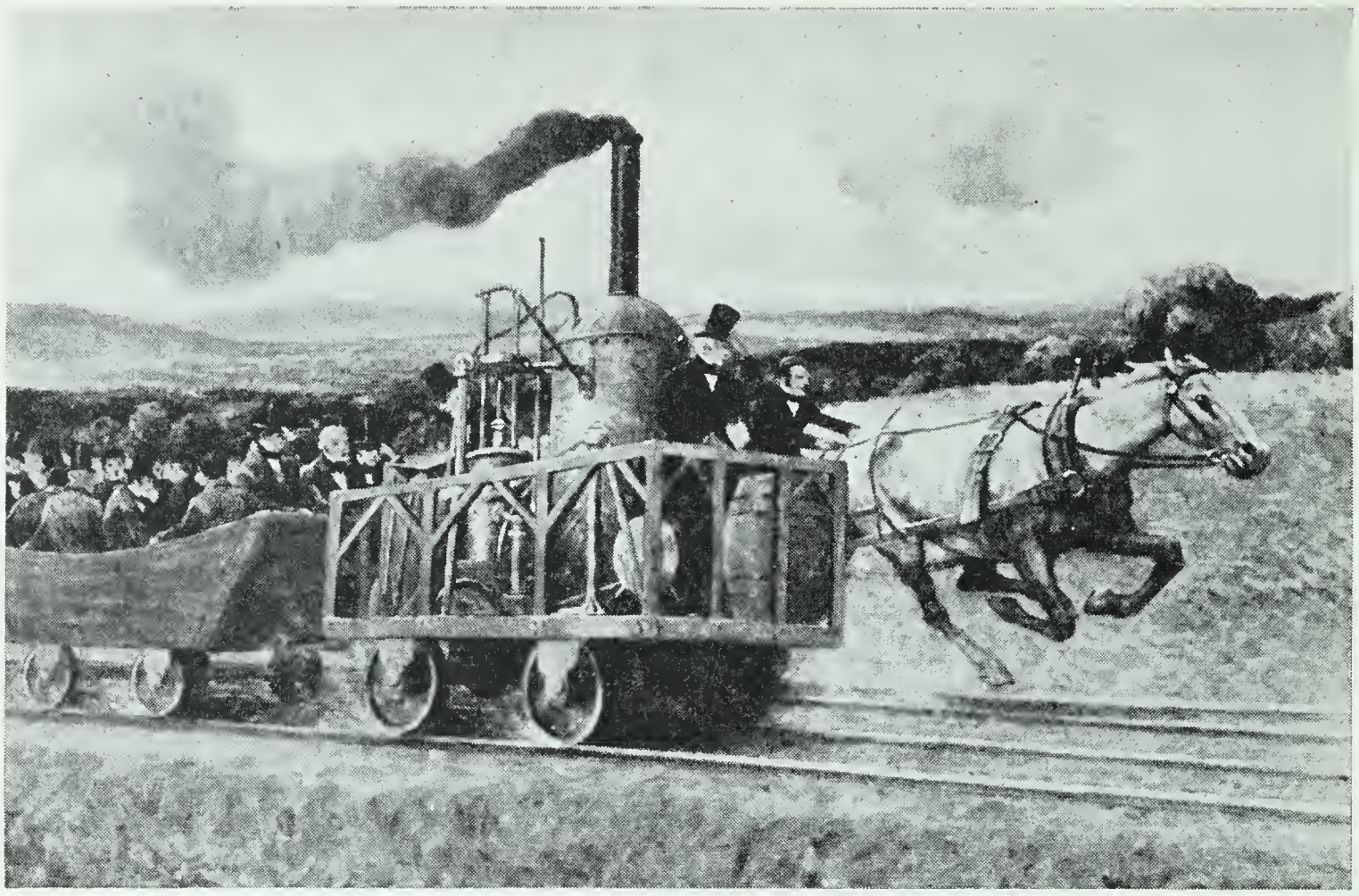
Never having been to school, he soon learned that there was much to be found out about engines and the power of steam in books that he could not read. He proceeded at once to visit night school, where he learned to read and write. Not until he was nineteen years old could he write his own name. Not until he had unlocked this treasure house of written knowledge was he content to stop. Working from sunrise to late at night, he still found time for night school three nights a week, paying three pence a week out of his small wages for this privilege. Soon he was reading all the books on mechanical subjects

he could lay hands on, planning and building engine models, and in the back of his mind forever dreaming of the day when an engine would be placed on wheels. He even dreamed, and boldly said so, that the day would come *when the poorest man in England could ride about the country, drawn by the power of steam!*

One day a friend took Stephenson to see a Mr. Pease. Mr. Pease, with other mine owners, planned to build a railroad. The old Quaker was much pleased with Stephenson, his plans, and his straightforward ways. "I'm just Geordie, the millwright from Killingworth," Stephenson said, "and this is what I believe I can do."

So finally he was told that he could build their railroad, which was to be known as the Stockton and Darlington Road. It was also agreed that he would be permitted to build what he called a *traveling engine,* with which to haul its trains. For Stephenson had convinced Mr. Pease that what we now call a locomotive could be made to do the work of an untold number of horses. "For," said Stephenson, "I can make the wheels stick close enough to the track to pull a load." That was what no one had been willing to admit could be done. There were regular laws of mechanics for this, if anyone had only known about them. Stephenson was going to apply the rules of what we call *tractive power.*

Owned by Quakers, the Stockton and Darlington Railroad was called the "Quaker Road." It was thirty-eight miles long, built to haul coal from the mines. When Stephenson was ready to lay track, he had to determine the width, or gauge, of the track. He had a large number of wagons carefully measured, and learning that the most common width or tread was four feet eight inches and a half, he determined to lay his track on that gauge, as ordinary wagons were to be used on it.



Tom Thumb's Horse Race

Today our railroads still measure four feet eight and a half inches between the rails. This is spoken of as *standard gauge.*

The Stockton and Darlington Road was a great success. On it Stephenson hauled twenty-two wagons, loaded with passengers, and twelve wagonloads of coal, at an average speed of five miles an hour. At one point he reached the unheard-of speed of twelve miles an hour. It would have taken thirty or forty teams of horses three days to do what Stephenson, with one small engine, had done in six or seven hours. As a result of this success, Stephenson was soon engaged to build another road—the Liverpool and Manchester Railroad. This he began to do the following year.

There was a great deal of opposition to the building of railroads in

England. Travel in that country by stagecoach had been brought to a point of considerable comfort and speed; it was feared that steam-drawn cars would injure the stagecoach business and reduce the number of travelers stopping at the inns and taverns along the way. It was also feared that much damage might be done in other ways. The smoke, people said, would so pollute the air that nothing could live in it. People would sicken and die; livestock would be too frightened to live; and no one could ride at the speeds that were being talked about. Many opinions were expressed that no one could travel at ten or fifteen miles an hour without losing his breath! One man wrote the newspapers that he would as soon be shot up in a rocket!

At last, a few miles of the road between Liverpool and Manchester were finished, and the question of how to run the trains came up. Should they be drawn by horses, or should the strange and somewhat dreaded steam power be used? Stephenson was, of course, greatly interested in this. He finally persuaded the directors of the road to offer a prize of £500 for a locomotive that should weigh not more than six tons, rest on six wheels, and be ready by October 1, 1829, to draw, day after day, twenty tons weight at ten miles an hour, with not over fifty pounds of steam. It was also required that each engine should have a boiler that was provided with a safety valve, and a steam gauge, and that it should measure not over fifteen feet to the top of the chimney.

Four engines competed. Each one was required to make ten round trips during the day, over two miles of level track at Rainhill. Each engine was to take a different day for the test. The first one used a bellows to blow up its fire. The bellows broke down, and the engine had to withdraw. The next one on the list had a leaky boiler and could

not start. The third one burst a water pipe and had to give up the contest. Then the *Rocket* came on. This was the engine which Stephenson and his son Robert had built. They entered it in the contest after much heartbreaking work in its building. For it contained certain features that were hard to create—features that today are considered necessary in every locomotive.

Stephenson had built other locomotives before this. In fact his first one was constructed in 1814. But these earlier engines were clumsy and slow, and were used only for hauling wagonloads of coal from the mines. With a load, they ran about as fast as a horse can walk—four miles an hour. But the *Rocket* was different. One of the features that made it different was the *tubular boiler.* That is simply a boiler full of small metal tubes, all of which are surrounded by water. As the fire from the firebox passes through these tubes in a fierce blast of heat, the water is much more quickly turned into steam than is possible in a boiler full of water without the tubular heating surfaces. Stephenson had twenty-five small copper tubes, each three inches in diameter, running the length of the *Rocket's* boiler, and dividing the great mass of water into many parts.

Another feature of the *Rocket* was that, unlike Trethevick's engine, the *Rocket* ran on smooth rails. Without ratchets or cogs it was possible greatly to increase the speed. The *Rocket* reached the speed of thirty-five miles an hour.

Then, too, Stephenson wanted a *better fire!* So he turned the steam exhaust from the cylinders into the smoke stack, so that, pulling the fire along with it, the draft was much increased. To make this the more effective, he pounded down one end of the pipe so that the exhaust

steam ran out through a very small opening. This acted much like the nozzle on our garden hose, through which an otherwise mild stream breaks with a good deal of force. This doubled the power of the engine. With these improvements it was a great success. The *Rocket* today is on exhibition in the Kensington Museum, London.

Stephenson's son, Robert, was now his constant companion and helper. His father, resolved that his son should be educated, had in their early days of poverty made shoes, mended clocks, and cut out men's clothes when his long day's work was done, in order that Robert might be sent to the university. To repay his father for this sacrifice, Robert learned shorthand, so that he might write down all that the teachers said. Then he sent the lessons home so that his father, too, might study them.

Later, as Stephenson prospered, he and Robert built great locomotive works and became quite wealthy. Shortly after the road between Liverpool and Manchester was completed, they were invited to build a line between London and Liverpool.

They also became famous as builders of bridges, some of which still stand. The High Level Bridge, as it is called, at Newcastle upon Tyne, was built by Stephenson. It is still in use. Without George Stephenson —Geordie, the millwright—and his steady fight for what he believed steam could do, the world might never have heard of what we call railways.

5

The Little Locomotive That Went to Sea

THE story of Chicago is a strangely tangled one; a tangle of early railroads and early struggles; of an Indian massacre and a great fire; of trade in grain, livestock, and footstuffs, by which a muddy little village in the middle of a marsh grew into a great metropolis.

A man once tried three times to tell this tangled tale. Several times, as he started, he had to begin again. First, he got under way something like this:

"Once upon a time," he said, "there was a little village. It was named Chicago. It was dirty, it was straggling, and it was very poor. . . ."

Everybody laughed. They knew better than that. Chicago is a great and busy city. So then he tried again:

"Once upon a time there was a little locomotive, and it had no track on which to run. So it got aboard a ship, and sailed and sailed. . . ." But that start was not satisfactory.

Finally he made a last attempt; his story of this wonderful city and its railroads ran something like this:

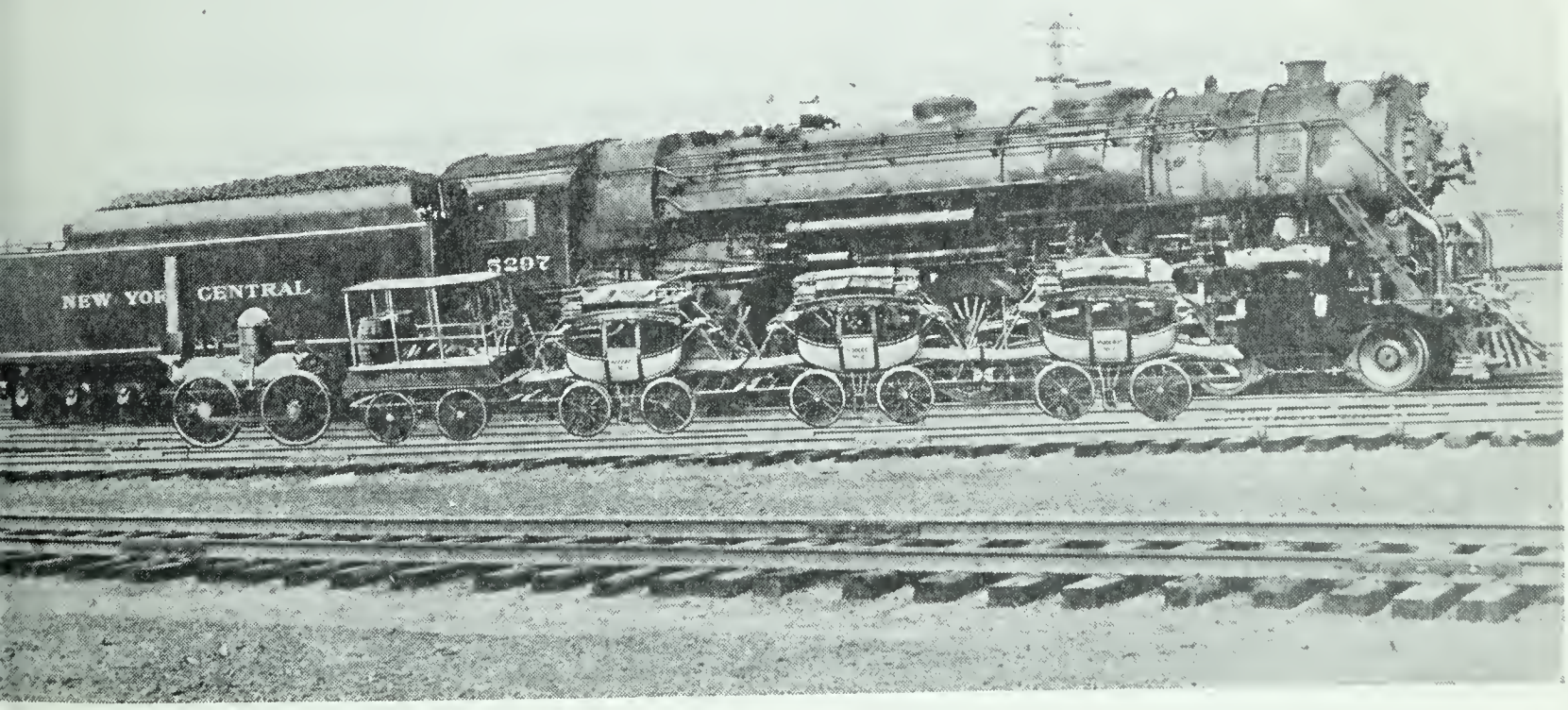
"About the time that the first railways were being talked of there was a village, called Chicago. Before it lay a mighty lake. Through the village flowed a sluggish little river; all about the village was a flat and desolate marsh. The village streets were unpaved, and the black prairie mud stuck to the wagon wheels and pulled at the horses' hoofs. On the lake busy steamers and sailing vessels came up the river to load and unload.

"It was a desolate town. As the people peered into the future they found little to encourage them. Their only hope for trade was with the farmers who were settling the newly opened prairie country; when some of them came in with corn, wheat, and hogs, the trip over almost impassable roads often cost the farmer more than the produce would bring.

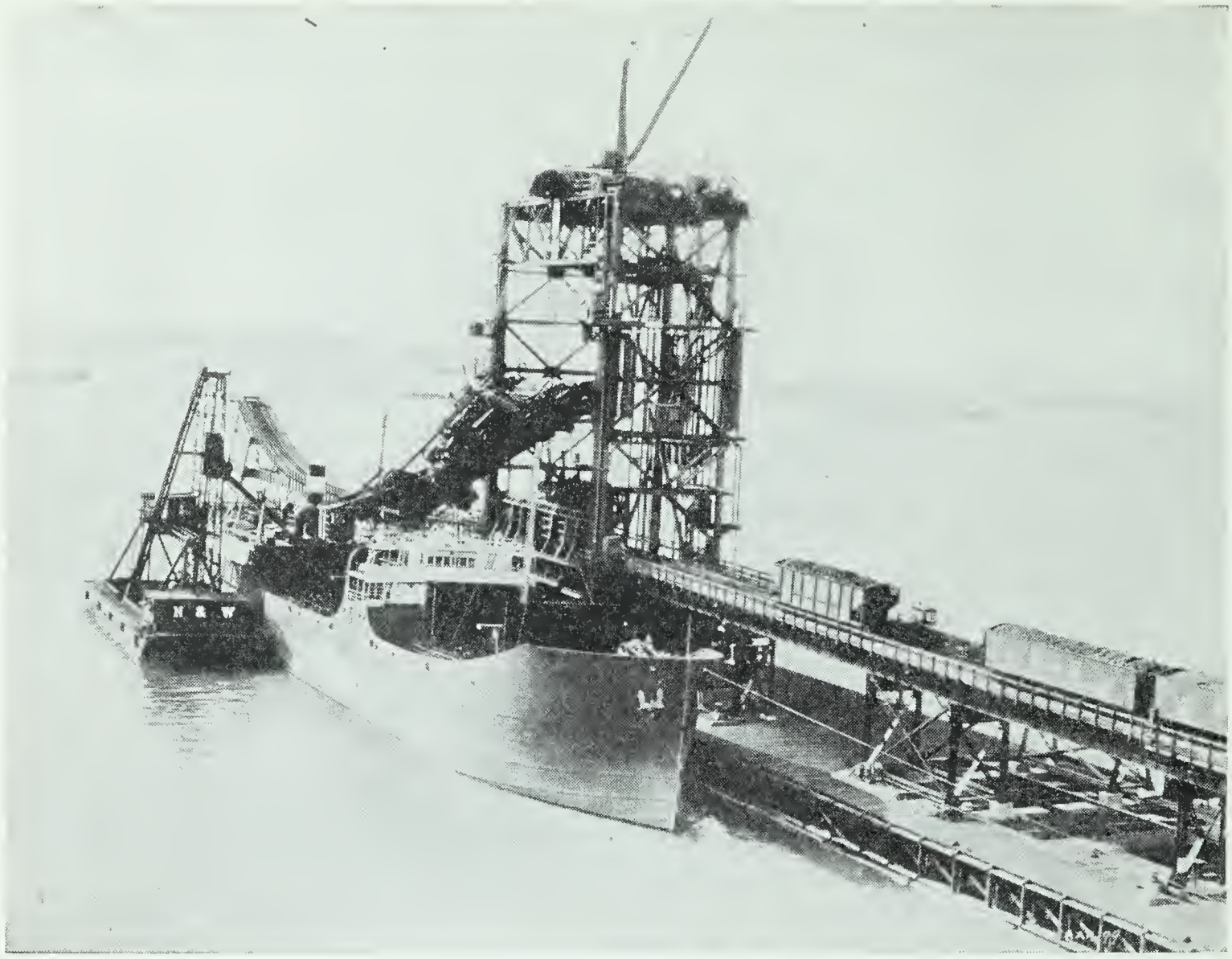
"It was a critical time for the frontier village and for the whole western country. The people of Chicago felt that what they wanted was a railroad. One was building toward them from the East. What they now needed was a way to reach the settlers who were moving into the prairies that lay to the west.

"To build a railroad was not an easy matter for these people, for they would need a great deal more money than they were able to supply. The town was small, trade wasn't very good, and the people were far from being wealthy. But even in that early day, Chicago believed

in sticking to whatever it started to do. At last the people interested Matthias Baldwin, of Philadelphia, in their plan. He helped them to buy a locomotive and rails enough to lay a few miles of track. This done, their engine, which was christened the *Pioneer*, had to be brought west from Buffalo; the problem of how to do this was the first one that had to be solved. There was no railroad between Buffalo and Chicago, or for that matter, between Chicago and any other place. So the little *Pioneer* was loaded on a sailing brig, the *Buffalo*, on Lake Ontario. Slowly taking advantage of favorable winds, the brig made its way through Lake Erie, Lake Huron, and Lake Michigan to its destination at the mouth of the sluggish little Chicago River. The villagers were delirious with enthusiasm. The little engine was taken ashore, and amid shouts and huzzas was drawn through the streets by



Little Black Nose and a Modern Locomotive



Coal-loading Docks

horses to the railroad tracks that had been laid at the western border of the village"—*the little locomotive that went to sea!*

This was in November, 1848. A week or two later, on a dull, dark, wintry day, while the *Pioneer* was snorting along with a construction train, a farmer, about twelve miles out of town, came into sight with a sled-load of hogs. There was a deep snow, and night was falling. The farmer's horses could hardly go; for two long days they had been pulling, pulling, in an effort to reach town.

The railroad men, being neighborly, told the farmer to climb aboard. They fixed up a place for the hogs, too, and finally, with much shout-

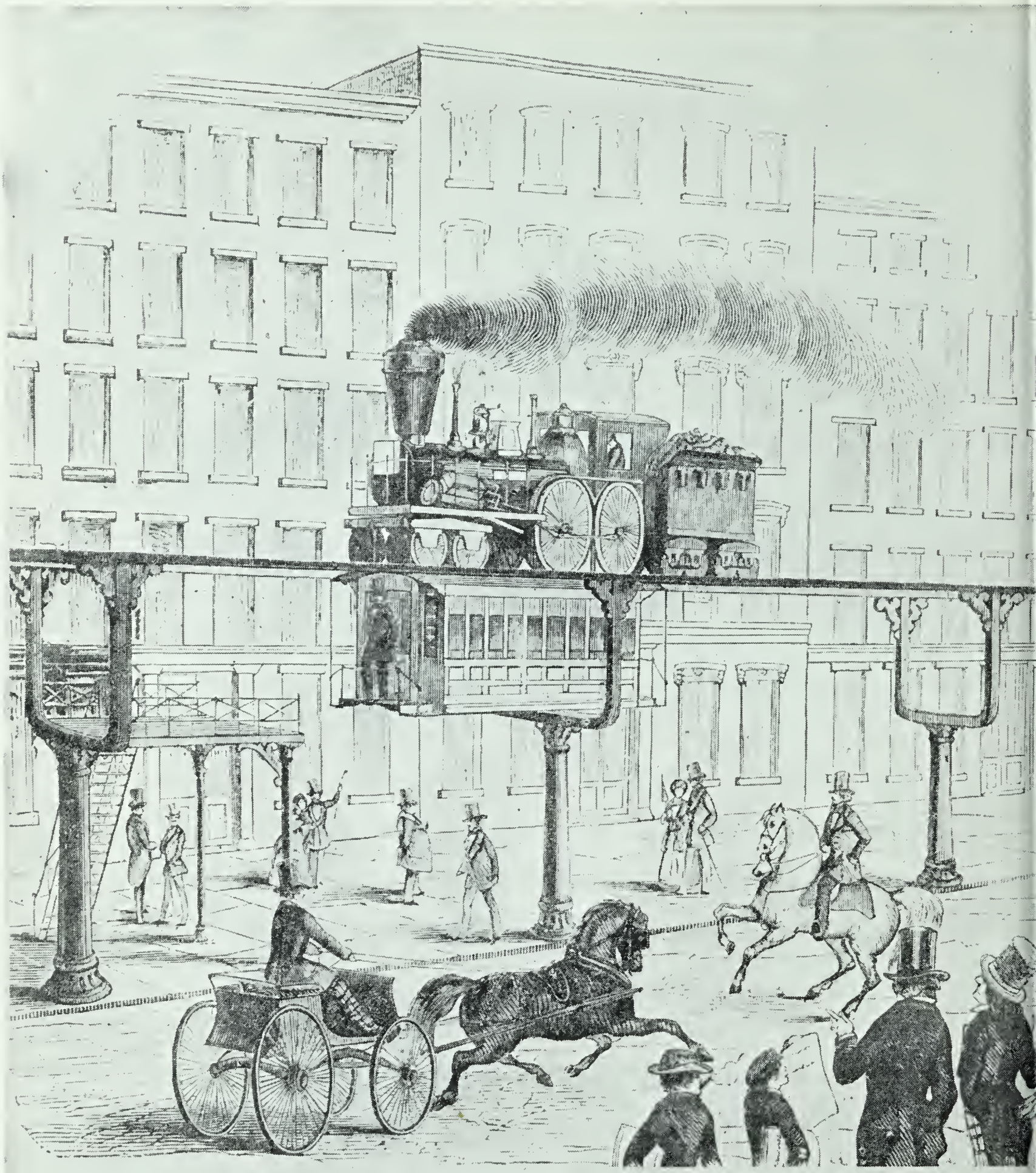
ing and grunting and squealing, the porkers were piled on, and the little engine soon whisked them into town.

It was a prophetic event. Probably none of those who had a part in it had any idea of what was to follow. But it is now a fact that these squirming, squealing pigs were the first of what has come to be an endless procession of sheep and cattle and calves and pigs to the world's greatest market for livestock. Thousands of them, in the early dawn, roll into Chicago in long trains, ready to reach the market before the buying begins.

The *Pioneer* brought the first load of grain and the first load of livestock into Chicago that reached that city by rail. Before that farmers, distant as much as one hundred and fifty miles, had to bring their produce to town by wagon. Today train after train from the western ranges and feeding grounds, as the sun comes up out of the lake, pours into the city daily to feed you and me.

Soon, too, Chicago became a great railroad center. The little locomotive that went to sea was the first of thousands that now throng Chicago's railroad yards, bearing to the city much that we eat and wear, and carrying away from it quantities of merchandise that Chicago sends to all parts of the world. Thirty-two great railways enter Chicago; in Chicago mills and shops freight cars are built, steel rails are rolled, and sleeping cars and day coaches are built. Materials for switches, block signals, railroad crossings, and telegraph lines are turned out in Chicago's factories; spikes, bolts, and plates for track laying are forged in the city's steel mills. Chicago is *the greatest railroad center in the world!*

As the West filled up and railroad traffic grew, it was seen that the



SWETT'S PROPOSED ELEVATED RAILWAY—FOR BROADWAY.

Proposed Elevated Railway for Broadway, New York

roads would soon take the place of the steamboat traffic that had hitherto been so important. Such towns as Alton and Galena, to which the railroads first were built, gave way in importance, and the rails pushed steadily west, opening up new regions to settlement all through the Mississippi Valley. Chicago and St. Louis grew into mighty market centers. Milwaukee, Minneapolis, with its immense flouring mills, St. Paul, and Duluth waxed great. Soon the roads reached the Missouri River, and today there is almost no town so small, in all the country between the two great rivers, that some railroad does not reach it and place it in direct touch with the outside world.

Nor did this activity stop when the Missouri River was reached. The Oregon Trail had been filled with homeseekers by 1844. California had been taken over from Mexico in 1848, and the people on the Pacific Coast were clamoring loudly for better means of keeping in touch with their former homes in the East. It was no longer enough that the Midwest should do a thriving trade with St. Louis and Chicago; there were cities to build at San Francisco, Los Angeles, and Seattle. Murmurs were heard about building a railroad all the way to the Pacific. Many reasonable people said that it was idle and foolish talk. But the murmurs grew!

6

Into the Golden West

ONE early spring day just before the pigs went riding into Chicago, the world was thrown into tremendous excitement. Deep in the forest-clad mountains of California, *men had found gold!*

People wouldn't have been much more excited had they suddenly found that the precious metal could be picked up in the streets by anyone who cared to look for it. All that was needed—or so it seemed to many—was to roll up one's trousers and wade into almost any small California stream, wash some gravel in a pan, shake out the dirt, and the gold lay glistening, waiting only to be picked up.

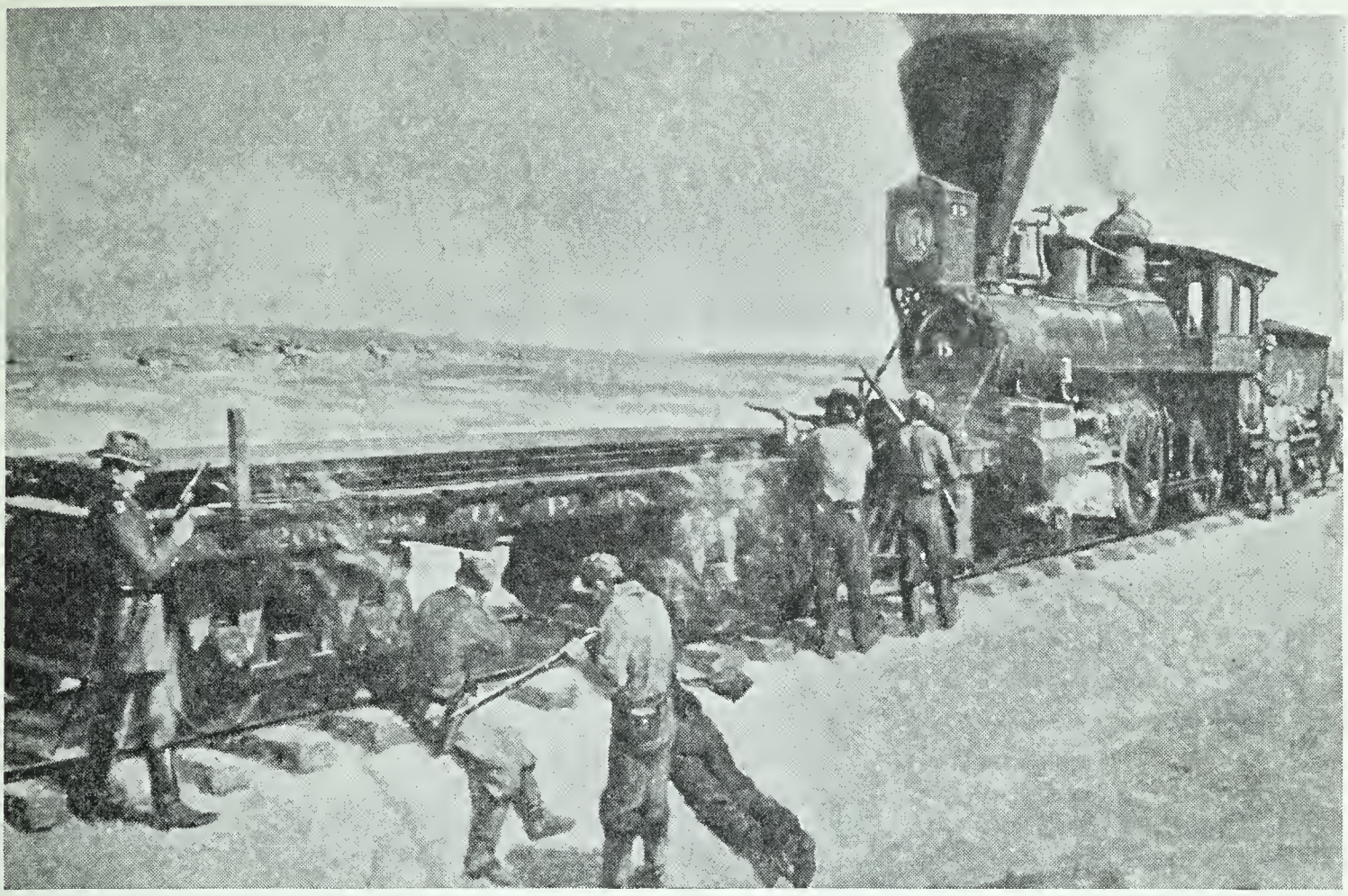
A man named Marshall, building a millrace for Captain Sutter,

of Sacramento, on the North Fork of the American River, had, in May, 1848, found gold! Men from all over the world flocked into California when they heard the news! They came in wagons, on foot, with pack trains, and on board ships. All kinds of supplies were in immediate demand—food, blankets, tents, picks and shovels, clothing, shoes. I tell you, *there* was a call for railroads! It was a call, however, that could not be filled immediately. The road was not built for a good many years after gold was found.

Meanwhile, across the prairies and into the country west of the Mississippi settlers were moving steadily. Since 1842 the covered wagons had been carrying thousands to the Pacific Coast. In 1848, the first railroad west of Chicago began to build slowly westward. Other railroads followed. In 1854 Kansas and Nebraska were admitted to the Union as territories; a few years later, the first telegraph line was completed across the Rockies, and in 1864 the first railroad west reached the Missouri River. All through the land of the Indian and the buffalo, little prairie dogs were scuttling for their holes as men hastened to open the new lines.

As to a railroad that would reach clear across the continent, there was considerable difficulty. California was so far away that a railroad across two thousand miles of almost uninhabited country was entirely too much for men to build without government help. So as the need grew great, the United States Government took hold, and in 1862 the Union Pacific Railroad was chartered by Congress.

There had been much dispute about where the road should be built. The people of the South wanted it built from New Orleans west. The people of St. Louis wanted it to start from their city and run straight

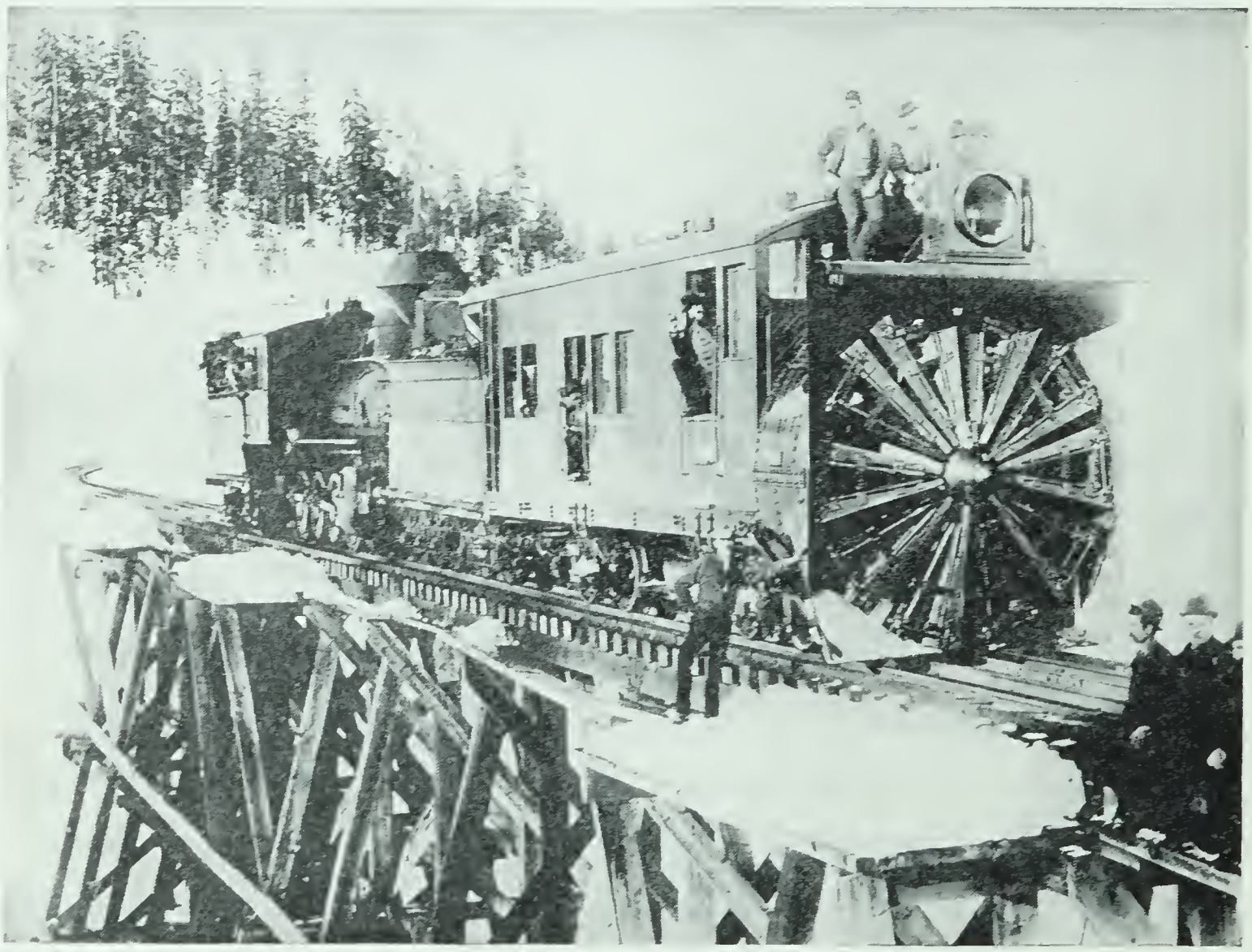


The First Transcontinental Railroad

across the backbone of the Rockies. Kansas wanted it built from their state west through Denver, and Chicago wanted it to start at Council Bluffs or Omaha. Another route that was strongly talked of lay from Milwaukee north to Lake Superior and thence west to Puget Sound.

Your map will help you. Pick out the parallels of latitude and you will see that the Southern people wanted to build along the 32nd parallel; St. Louis along the 35th parallel; Kansas along the 38th and 39th parallels, and Chicago along the 41st and 42nd parallels. We do not often think about these parallels today; but in those days they were talked about in every town and village and around the friendly fire in every country store. Why? Because not only was the question of controlling the western trade involved; but also the serious political question of slavery that finally led to our War between the States.

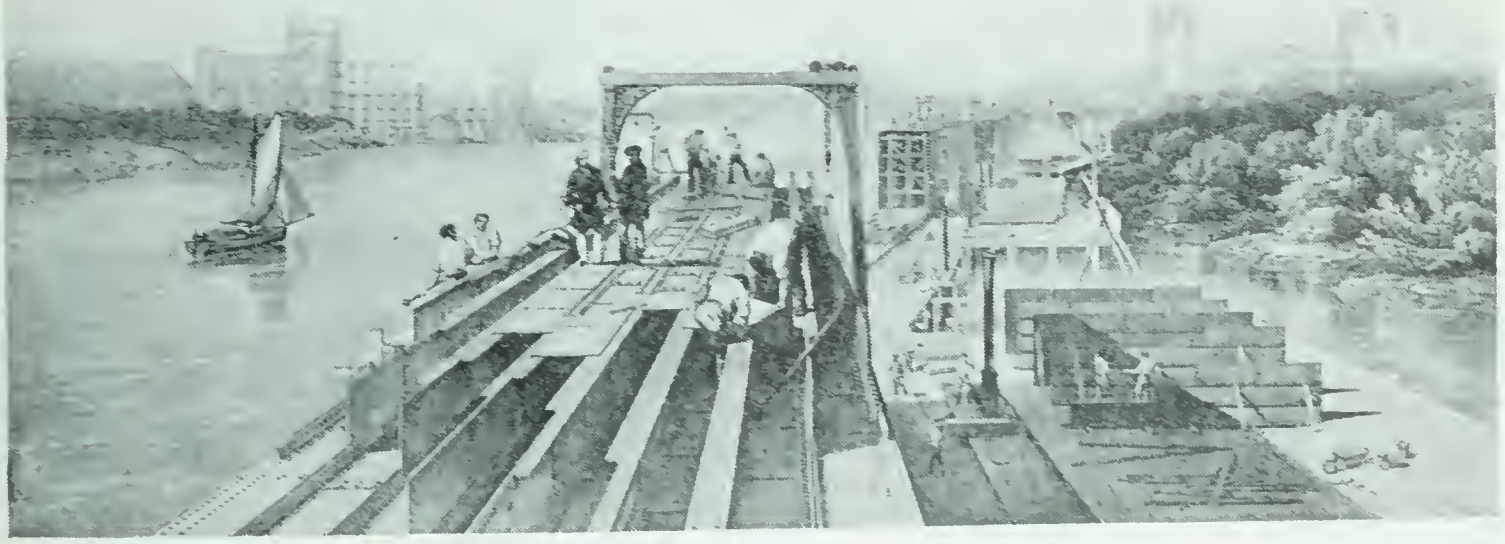
When Congress, in 1862, granted a charter to build the road, it was very liberal in its offers to anyone who might have the courage to come forward and make a contract to do the job. In addition to large grants of land, the government agreed to make loans in the form of government bonds to the amount of $16,000 for every mile of road built across the prairies; $32,000 for each mile in the desert country, and $48,000 for every mile of mountain road. But even with these rich subsidies it was difficult to find men willing to risk money upon such an uncertain venture. When the books were opened for subscriptions to the stock of the new road, only thirty-one shares were subscribed for in the whole country. The land was torn by the miseries of the



In Early Snow Plow

War between the States; most of the able-bodied men were in the army; and there was a long gap between the eastern railways and Omaha over which supplies would have to be hauled.

Finally, the company was formed; the location of the road was determined. Council Bluffs was to be the eastern terminus and San Francisco the western, and work was begun. No less than 25,000 miles of surveys were made before the location of the line was finally completed; for much of the route was through country in which a way had to be found through mountain passes and across unexplored country. Hostile Indians attacked the surveyors, many of whom were killed. The road lay through a country where, for a hundred miles at a time, no water was to be had. For six hundred miles no white man



Bridge Construction in the Early Days in England

was to be seen. Many of the builders, veterans of the War between the States, stood ready to lay down pick and shovel, to seize musket and cartridge box, and to stand ready to repel Indian attacks.

At the western end of the road the question of getting supplies was a serious one. Locomotives, rails, everything of which a railroad is built had to be brought from the East by sailing ships around Cape Horn. At one time Collis P. Huntington, one of the builders, actually bought every ship he could find in New York to carry supplies. He bought up more than twenty ships!

In the mountain country the difficulties were unbelievable. General Dodge, who had charge of the work on the eastern end said that in crossing the Wasatch Range, track was laid in the dead of winter, "on top of snow and ice. I have seen a whole train of cars, track and all, slide off the bank and into the ditch as a result of thaw and ice. . . ." and: "In winter the blasting of frozen earth was sometimes as great as that of blasting rock." But in six years these pioneers built eighteen hundred miles of road—a mile a day, winter and summer, laying as much as six miles a day when conditions favored them, and opening, in 1869, what was then the longest railroad in the world.

Out in the western country, at Promontory, Utah, with the Great Salt Lake shining near by, the rails were about to meet. On that morning of May 10, crowds of expectant people all over America thronged the streets. The telegraph had now been built west so that it connected the Eastern States with the Pacific Coast. Now it was held in readiness to tell everyone when the last rail was down. There was an interest and excitement that we find it hard, in these days, to understand. People walked the streets and besieged the newspaper offices. Great

public meetings were announced. "Stand by to hear the signal!" the telegraph keys ticked off. The crowds grew silent. "Hats off—a prayer is being offered," and the people stood with bent heads, only a few moments later to break into loud shouts as the final scene was played.

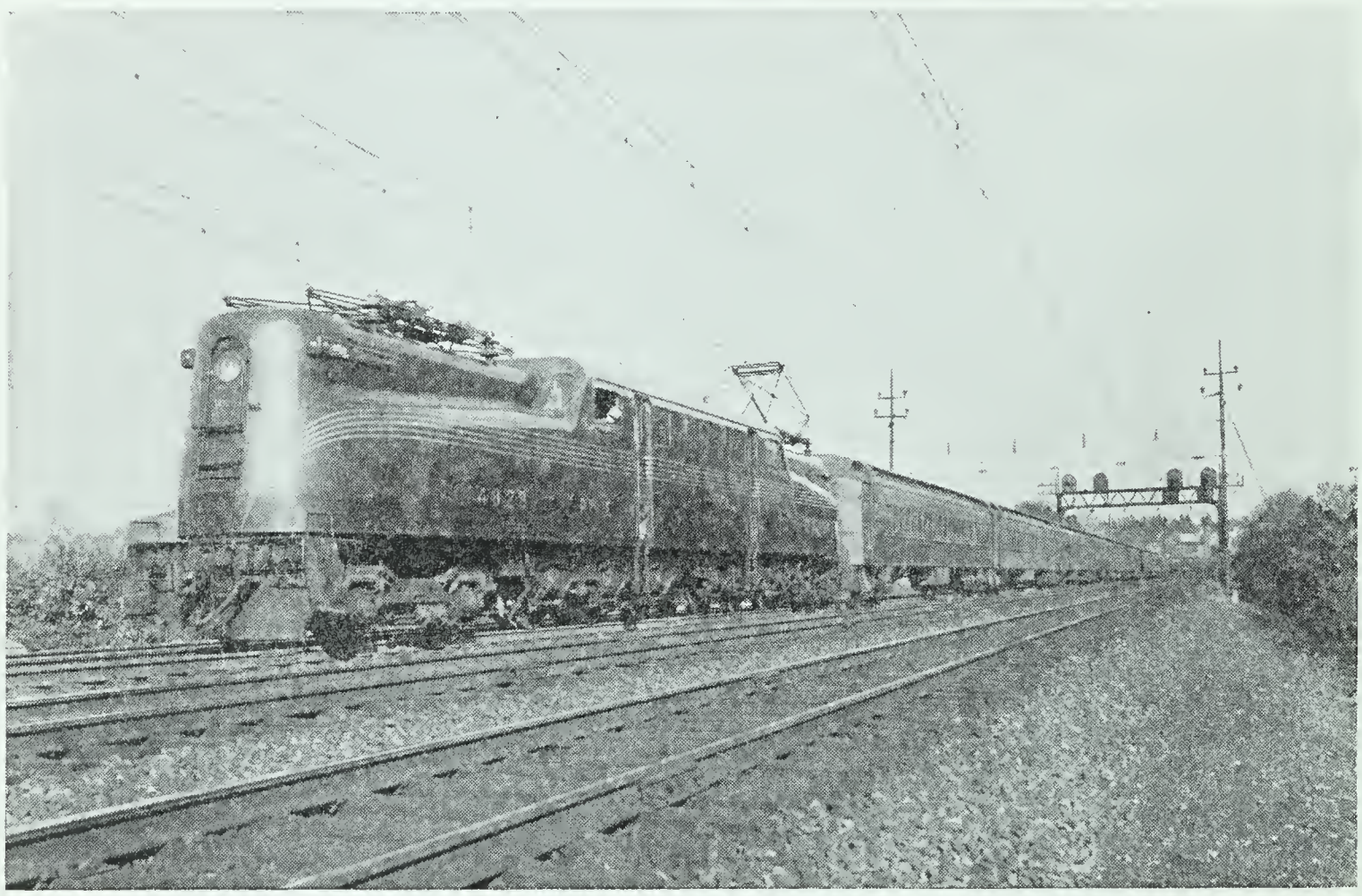
At the scene itself were a few hundred people—Mexicans, white men, Chinese, Indians—who stood breathless as the two engines at the rail heads drew closer in. The two locomotives moved slowly forward. They almost touched! A shining golden spike was lifted, placed, and the hammers drove it in. The telegraph gave the final signal, and as crowds in distant cities gave an exultant shout, America's first

Driving the Last Spike

railroad had spanned the continent. The battle had been won that had opened when the *little locomotive had put to sea!*

In England, where no point is more than sixty miles distant from the sea, railroads had been built to fill a need. The rails were laid to join cities already in existence and in need of better means of travel. This new transcontinental railroad in America was not like that. Distances in America were greater, cities were few and far between, and the population was scattered. America, therefore, was building roads to *create* a need—to attract cities where only villages had been, and to open up farmlands where the buffaloes and Indians had roamed over the hard-baked prairie sod and where no white man had ever stepped.

So it was that as what we call the Great Westward Movement went on, other roads to the Pacific followed this first one. It is interesting to



A Streamlined Electric Engine of the Pennsylvania Railroad

see how each of them chose one of the routes along the parallels of latitude of which we have spoken. The Southern Pacific reached out from New Orleans along the 32nd parallel; the Santa Fe from Topeka moved southwest to the 35th; the Denver and Rio Grande, under General Palmer, climbed the backbone of the Rockies south of Denver; and the Northern Pacific and the Great Northern built along the northern route to Puget Sound.

The courage it took to build them, the vision it called for to see what the country was to become, the whole act of creating these highways of traffic across a continent form an epic of pioneering hardihood, and are evidence of the power of American courage and faith.

7

The Railroad and the Telegraph

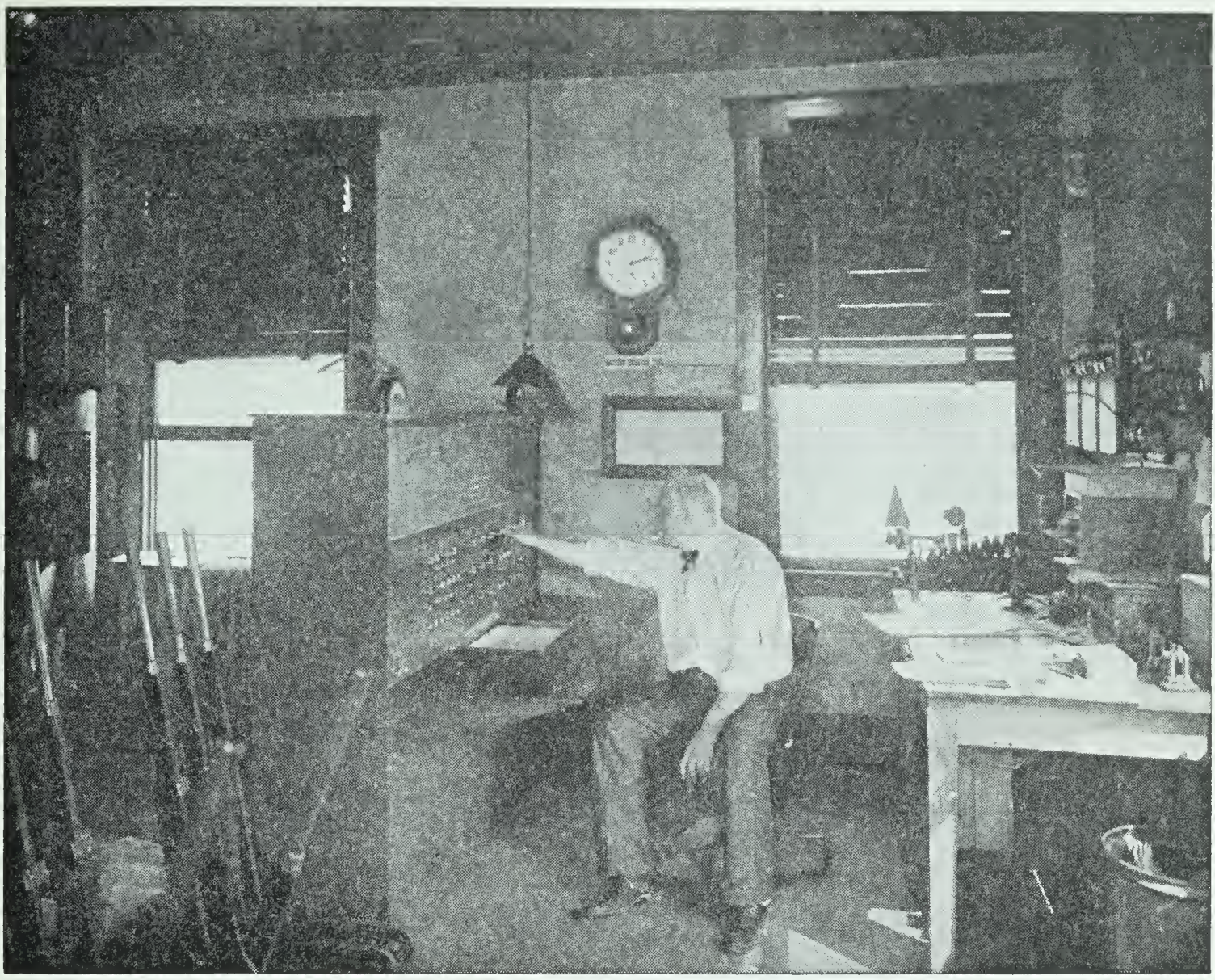
OUT in the land of the silver shilling, when railroads first began to run, many strange things happened. One of the funniest was that they were always *losing their trains!* For while the trains started out all right, no one knew when they would arrive or get back. They would get off the track, or break down, or run into a washout; and no one would hear about it until somebody came limping back to get help. There was much trouble on the early railroads, caused by landslides, snowstorms, floods, and trains off the track; and even when your ticket didn't call for it, as some of the old tickets did, you often had to get out and help put things right.

So something had to be done about it. Each railroad had only one track, and a train going in one direction couldn't start out until the train coming the other way had come in. That meant that if it was late —and almost all the trains *were* late—the passengers would have to stand around and wait for it.

Because of this difficulty, the railroads put up what they called *look-out posts.* A tall, straight tree was cut, the branches lopped off, and the tree set up beside the track. When it came time for the train, the station agent climbed up to the top and sat there in a little boxlike seat until he saw a bit of smoke in the distance and called down the news as the train drew near. Then he would climb down, look after the baggage, and help everyone aboard, and away they would go. Not many trains could be run on such a railroad.

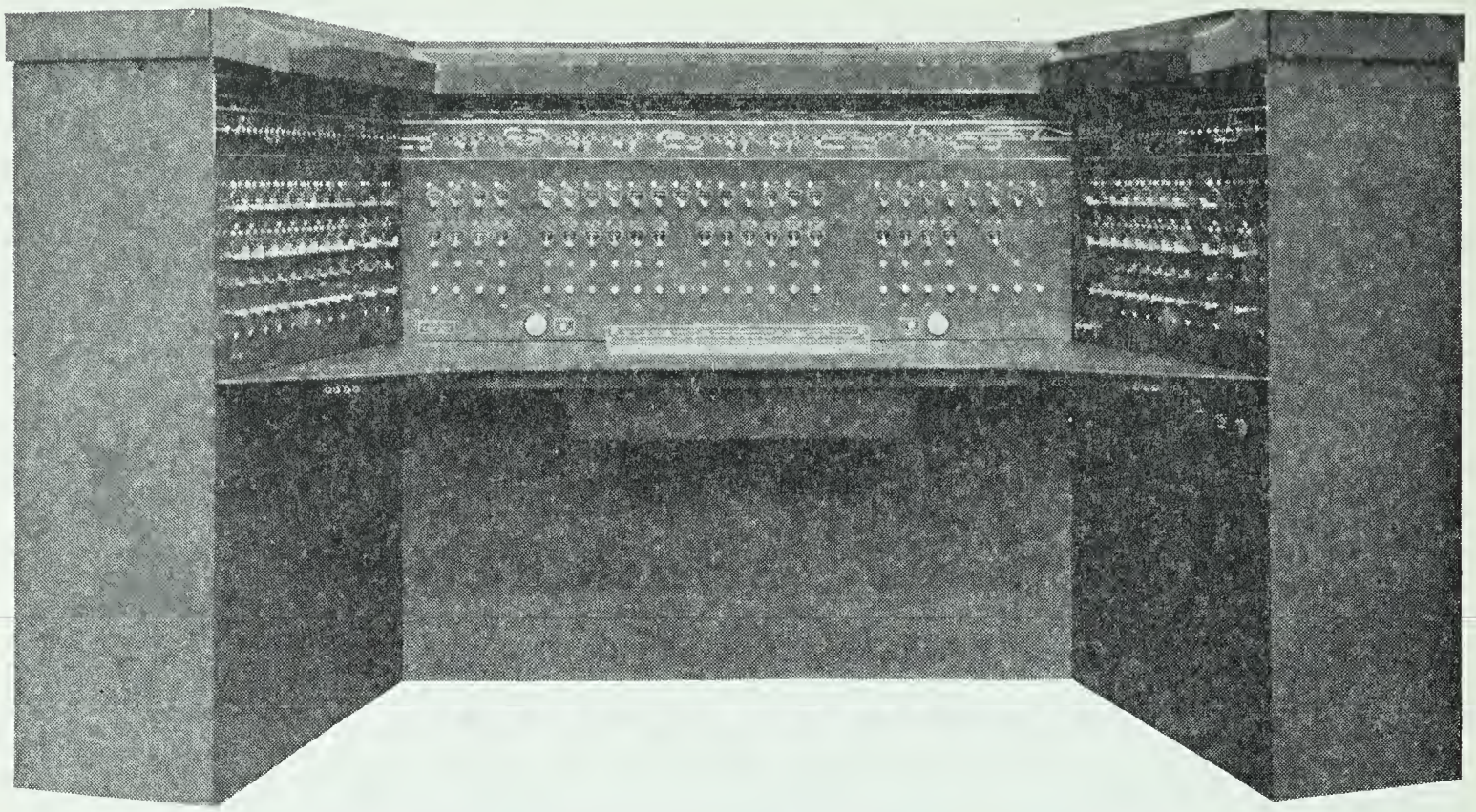
In some states, when railroads were first built in America, it was possible for anyone who had a horse and wagon to use the railroad just as we now use the streets. Put your wagon on the track, hitch your horse to it, and you were off! Much confusion resulted. One wagon would start east at the same time that another one, a few miles down the line, started west; when they met, somebody had to turn back. This made a good deal of argument, and fisticuffs were very likely to follow.

To remedy the trouble, *passing posts* were erected halfway between the passing points, and the man who had passed one of these posts had the right of way over the one who hadn't come so far. The other team then had to turn back until a passing track was reached. All this was soon changed when locomotives began to run; yet but little traffic could be handled.



In a Signal Tower

Then, in 1844, Samuel F. B. Morse, a portrait painter, invented the magnetic telegraph. Congress had finally given him aid with which to build a telegraph line between Washington and Baltimore, and the first telegraph message had flashed over the wires. Within a few years messages were going everywhere, even under the sea; and the thing which had seemed to many to be only a toy soon proved to be one of the most useful means of communication ever devised by man. To the new railroads, although they were slow to adopt it, the telegraph was like life itself. Now they could find their lost trains. The station agent no longer was compelled to climb the lookout pole. Instead, he could



Electrical Controls in a Modern Signal Tower

sit comfortably, tick off a few dots and dashes, and learn just where each train was, and when to expect it.

That is made possible because the movement of each train, as it passes a telegraph station, or signal tower, is reported to the train dispatcher on duty at division headquarters. Thus its location is always known, and its movements are always subject to such orders as he may issue. Under the chief dispatcher are a number of assistants, each of whom "sits in" for a given period of time, called a *trick*. With a great ruled sheet of paper before him and with nimble fingers on the telegraph key, there he sits, talking with stations and signal towers up and down the line much as though they were in the same room.

"Tell Conductor Simpson to come to the key," he says to the operator at some little station a hundred miles away, and the conductor of the way freight enters.

"You say you met 403 at Parson's Crossing?"

"Yes. He says his engine has broken down."

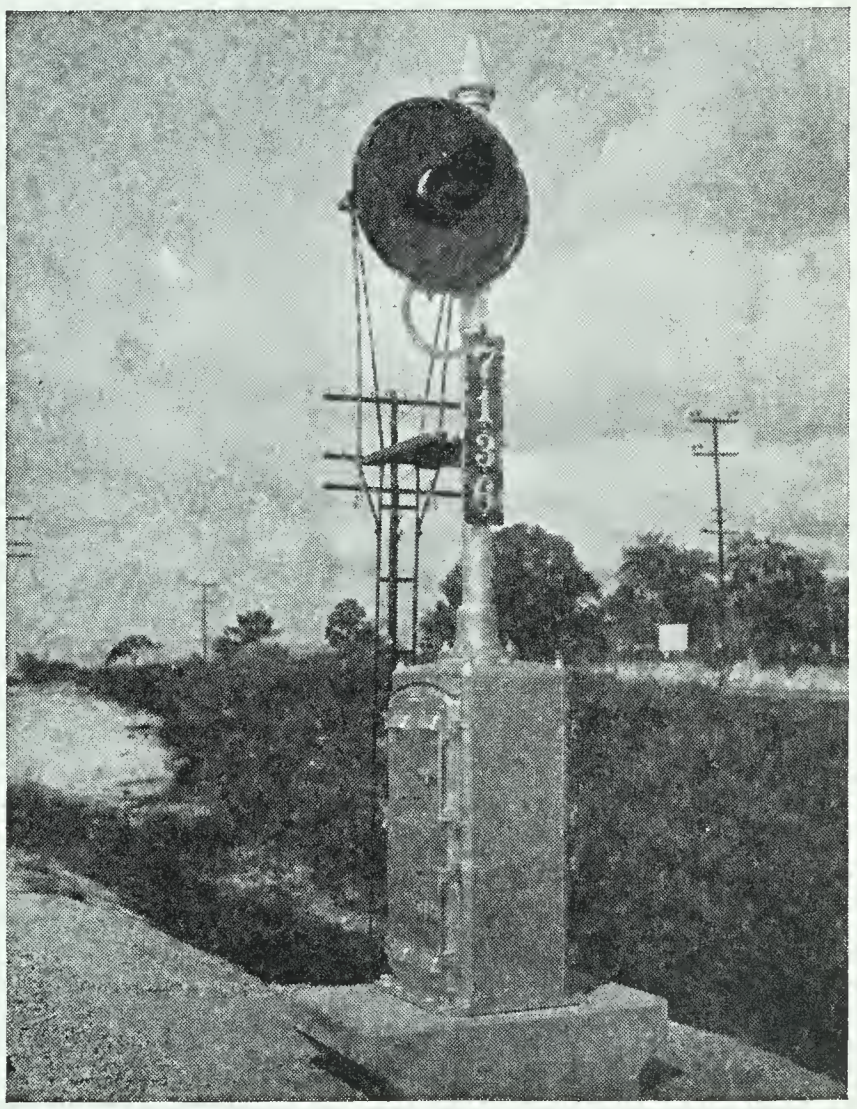
"And what have you got on your train?"

"Ten empties and six cars of coal."

"Leave the empties where you are and run back and bring him in."

It is as if the miles and mountains that may lie between them had been removed. Today the telephone and the telegraph can be operated on the same wire, at the same time, without confusion; and two, four, six, or eight telegraph messages may be sent over the same wire at once. Some of them can even go in one direction, while the remainder go in the opposite direction.

Each train order is signed with the chief dispatcher's initials, although one of his assistants may be handling the key. With a dozen or a hundred trains under his control, the dispatcher has his hands full. He has all the responsibility until, his *trick* done, he "signs off," and another takes his place.



A Modern Electric Block Signal

Sometimes he has to clear the track for a special by orders flying here and there to place trains on sidings and to wait for the special to pass. Sometimes there is a flood or a wreck, when the

cold sweat stands out on his forehead as he works his key frantically, orders out the wrecking train, calls out doctors and nurses, and starts the whole division into sudden life, so that everything may be done that it is possible to do.

Most of his life is quiet, though. All day long a record of moving trains—mail trains; empty coal cars; trains of silk, of livestock, of iron ore or coal; refrigerator trains of fruit or meat; and long trains of Pullman sleepers that shimmer in the sunlight as they pass. As we who travel sleep and eat, or laugh and talk, we seldom think that over us the wires are singing, and that we are cared for and our safety made sure by the men who watch so ceaselessly at the dispatcher's telegraph key.

8

This Train Niver Shtops!

SOMETIMES railroads and railroad trains seem to do things that are very strange. For instance, in some countries they make all sorts of fuss about getting trains ready to start. The engineer blows his whistle; the station master walks up and down ringing a bell; the guards run along the train calling to one another and slamming doors; the passengers hurry and scurry and climb aboard; and finally the train gets under way. It's all about as noisy as our Fourth of July!

It reminds me of a story told by a brilliant woman who once wrote a witty book about Ireland. In it she told about a little Irish train that ran a few miles down to the junction with the main line. It was a

modest little train, but the old Irish station master was very proud of it. Before it started he would stride up and down the platform ringing a big dinner bell, and shouting at the top of his lungs, "This train *niver* shtops! This train NIVER shtops!" until, finally, by dint of much persuading, the leisurely farm folks stopped gossiping, the carriage doors were closed, the engineer blew a long and ear-piercing blast on the whistle, and they were off—and they *niver* "shtopped" until the junction was reached, some ten miles down the line. Now in America, although the train may be starting on a journey of hundreds of miles, the conductor simply calls out "A-l-l A-b-o-a-r-d!" We board the train quickly, and off we go!

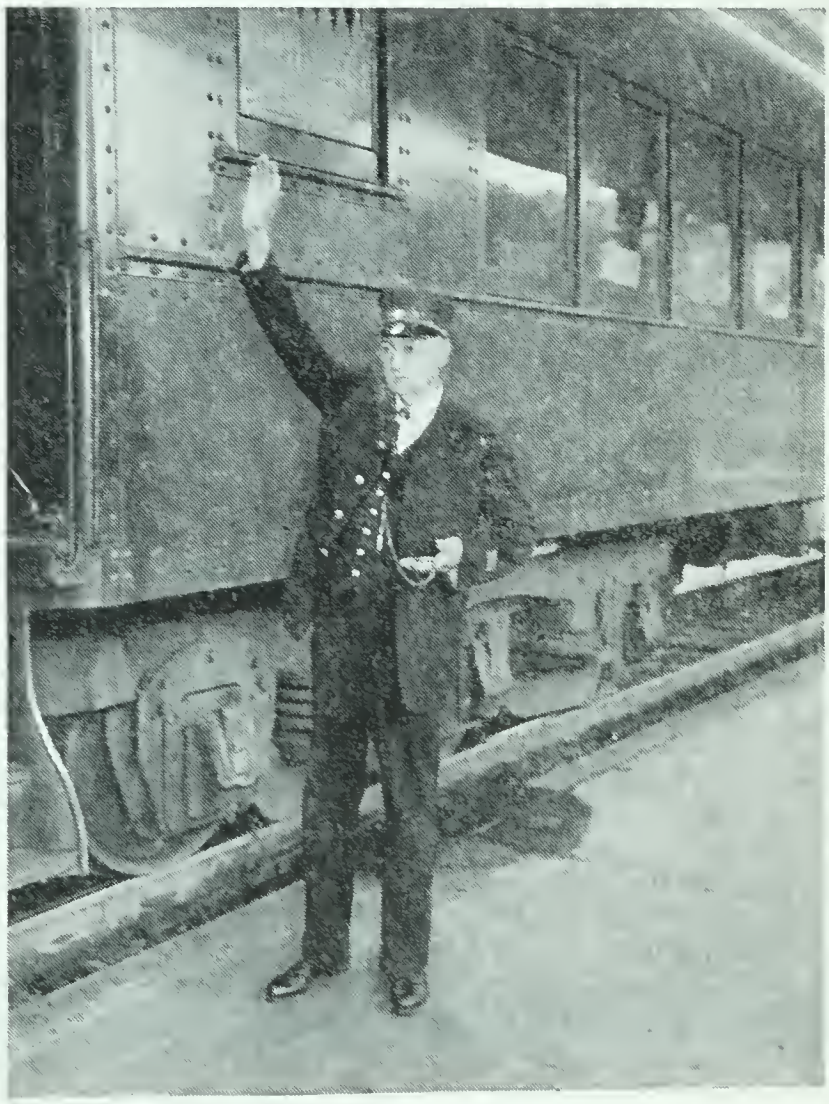
That's rather queer, too, for in all those first railroads in England and America the only wonder seemed to be that the thing *would* go! All the excitement was about getting under way; not once did it seem to occur to anyone that they would have to stop! The brakes were but poor makeshifts, something like those on *Little Black Nose.* These were on the engine only, leaving the cars behind it to run against one another with more or less of a bump! Railroad trains had many such bumps before they got good brakes. Finally a young man named George Westinghouse saw the difficulty and took up the problem. His father built threshing machines and farm machinery, and George soon learned that while it was all right to get a machine to start, there must also be some way in which to make it stop, and that the faster the wheels went round, the more important it was to stop them quickly! He began to study about railroad trains. They needed brakes, he thought, even more than did threshing machines. For sometimes, if a train was not quickly stopped, lives might be lost and property destroyed.

On passenger trains, in those days, there were brakemen on the platforms of every car. Half a mile or more before the train reached a station, the brakeman would seize a brake wheel and begin to twist it, swinging out from the side of the car from time to time to see how near the station they were and then back to another brake wheel to twist with all his strength, until at last the train stood still.

On freight trains it was even worse. On nights when there was snow and sleet, the brakeman had to run over the slippery tops of the swaying freight cars, setting the brakes, and risking life and limb to stop the rushing, plunging train. Then, too, the trains were growing longer and heavier, and running at higher speeds. The time had come for better brakes.

Just as George Stephenson had set his mind to work on the problem of how to make railroad trains *go*, so George Westinghouse now put his mind to work on the problem of how to make them stop.

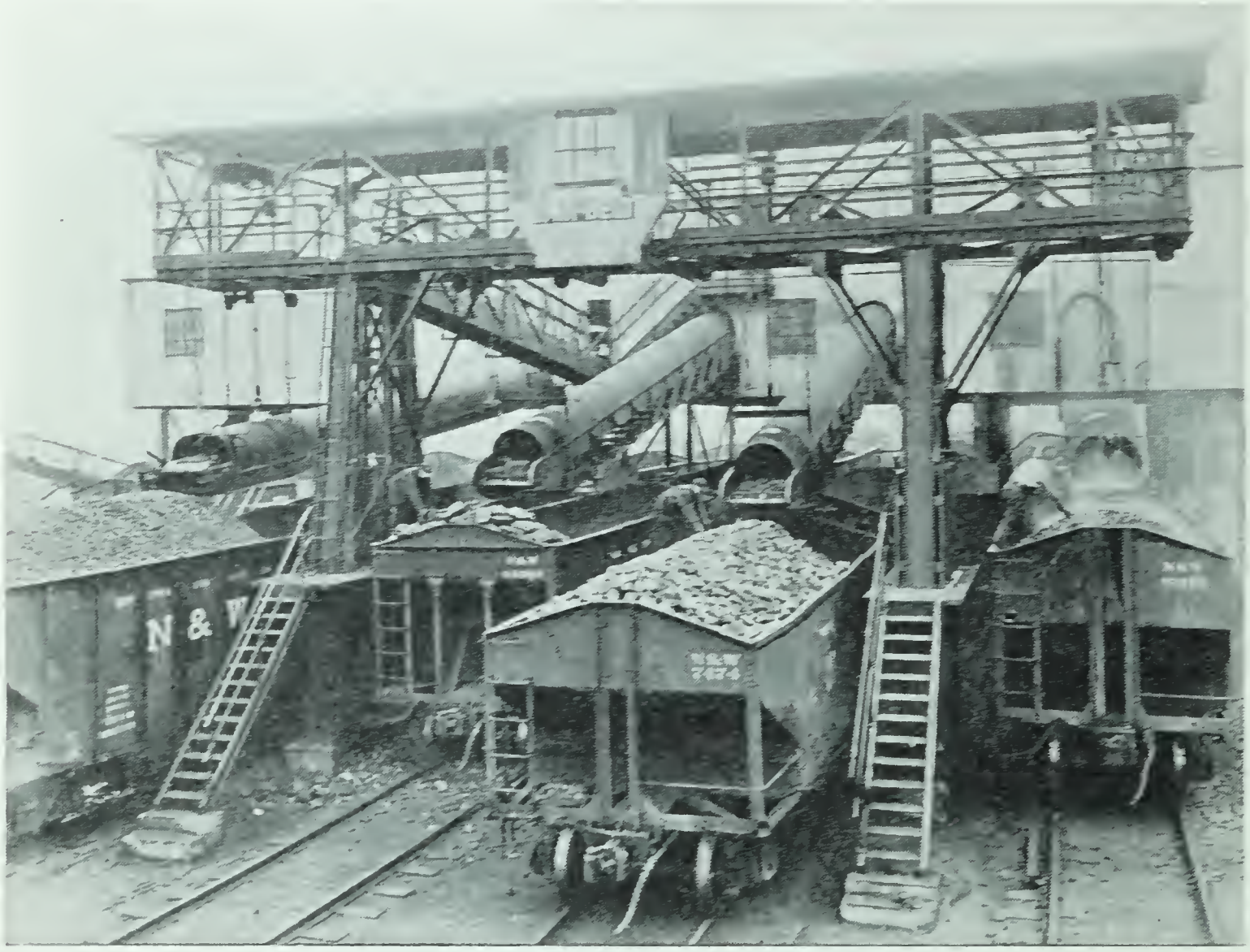
One day he met a man who told him the problem had at last been solved. "There's nothing," he said to George, "to be learned further about brakes. I can put a big windlass on each



A-l-l A-b-o-a-r-d!

locomotive, so that all the engineer has to do is to press the windlass against the driving wheels. When the windlass turns, it winds up a chain that will set the brakes on every car in the train." But the thing didn't work out very well. Sometimes the windlass would slip just when it was most needed; and sometimes the chain would break. Then, too, the long chain would stretch a good deal, so that before the end of the train was reached much of the pressure on the brakes was lost. It was soon seen that that plan wouldn't work.

Westinghouse then thought that a steam cylinder might be used instead of the windlass; when the piston moved it would draw the brake

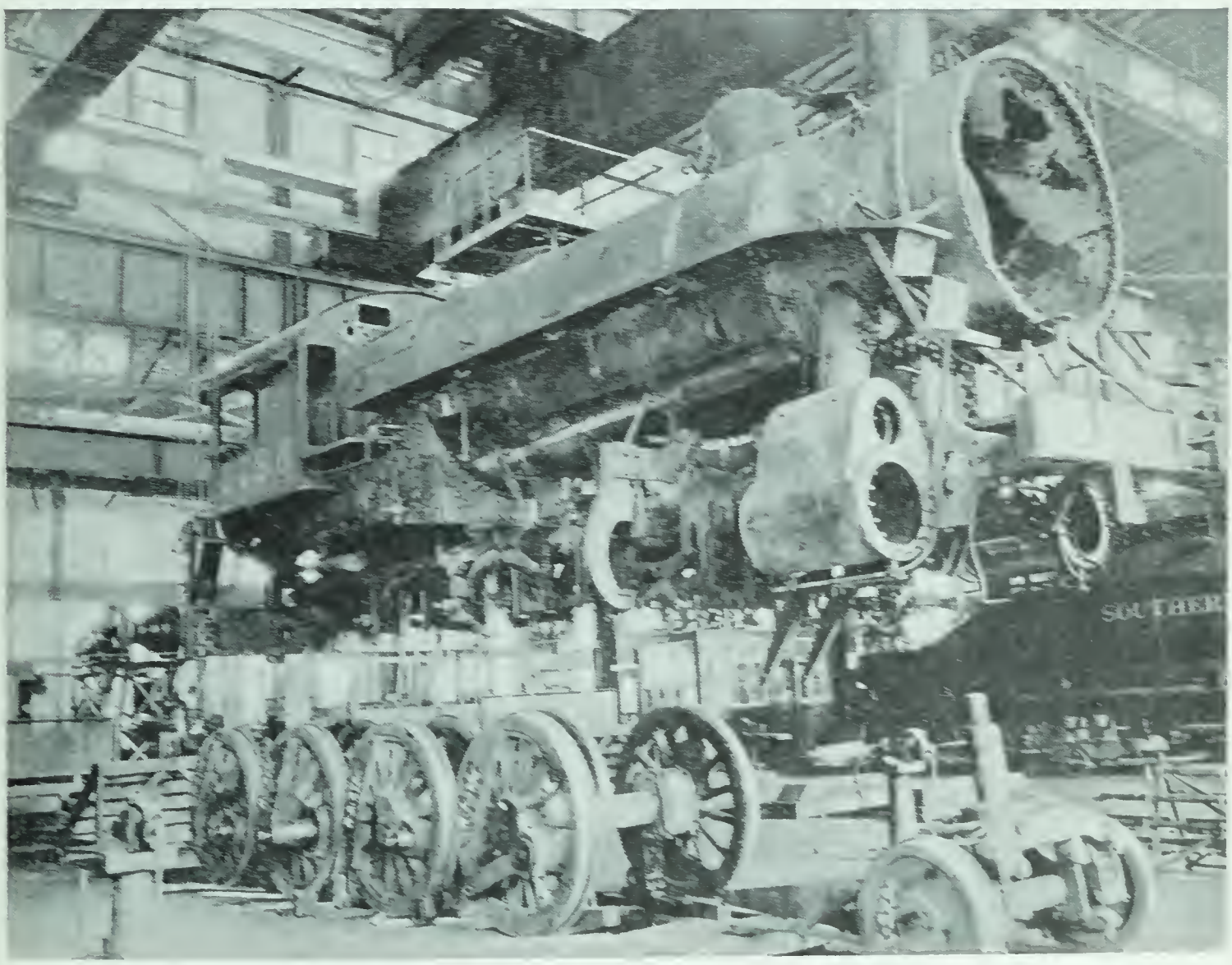


Loading Coal at the Mines

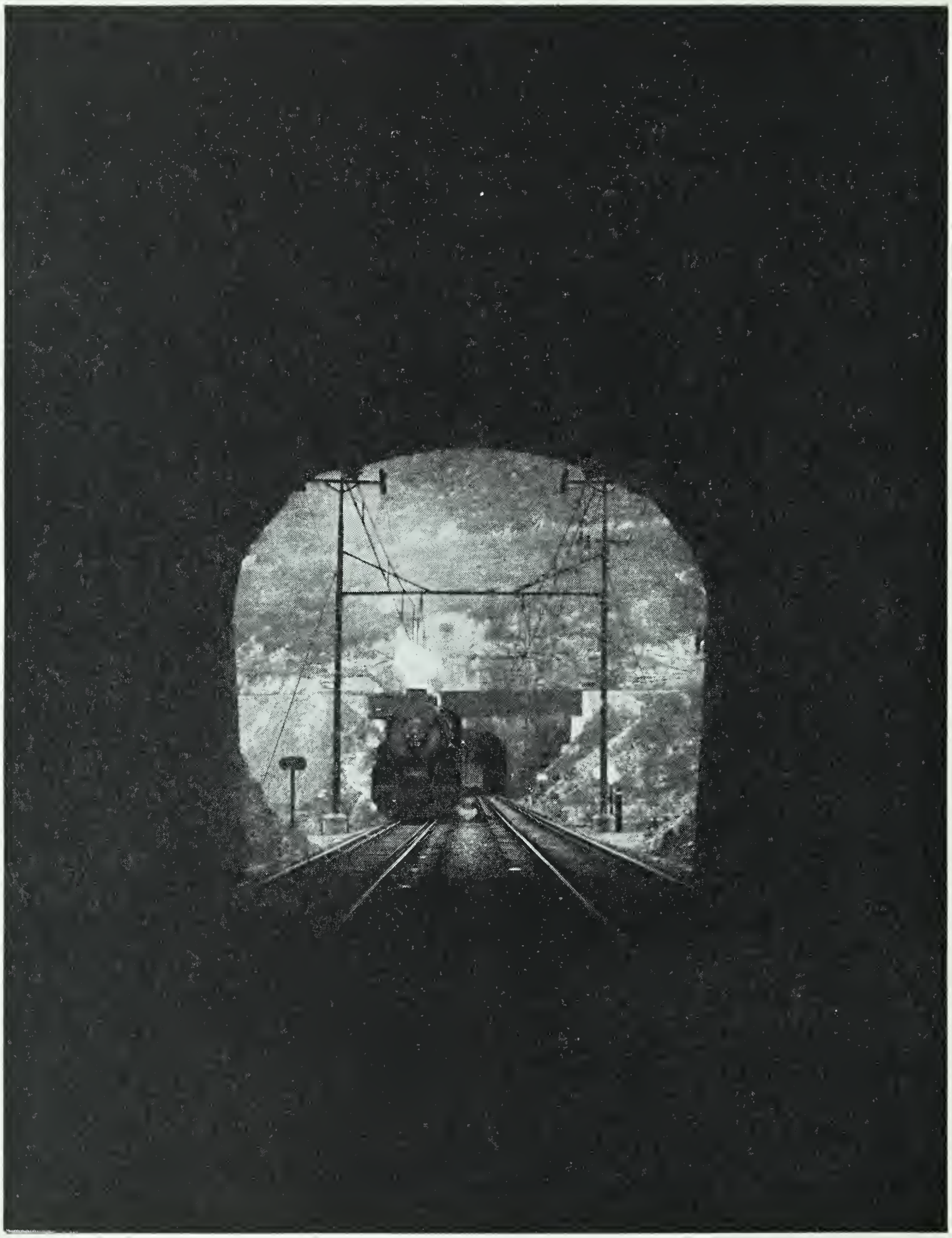
chain tight. But that still left him with the problem of a very long and unwieldy chain, running the whole length of the train. Then he tried a separate cylinder under each car. He soon found that by the time steam from the locomotive reached these cylinders, it had cooled off until it had little or no power. If hand power wouldn't do, and steam power wouldn't work, where should he turn next?

One day when everyone had left for lunch, he sat in the doorway of his little machine shop, much discouraged. A young woman passing, paused to ask:

"Don't want to buy a book, do you?" He didn't look up. "Or a



Repairing a Locomotive



Mountain Tunnels

magazine?" She placed one in his hands. He glanced at it idly. A headline caught his eye. "The Mount Cenis Tunnel," it read, and the story told about the building of a great tunnel under the Alps. He looked again. Three young Italian engineers, it said, had found a new way to bore through the mountain. They were using just common, everyday *air. Compressed air*, they called it, pressed down until it occupied only one-sixth of the space air ordinarily requires. Then, when they let it escape, it came out with a roar of power—a power of what we call *six atmospheres.*

Westinghouse gave the woman the only dollar that he had left. He took the magazine. He had found what he had searched for so long. If those Italian engineers could carry air into a tunnel three thousand feet, he could carry it under a train. Like Morse with the telegraph, a way had been shown him when he was almost ready to give up. He determined *to set brakes by air!*

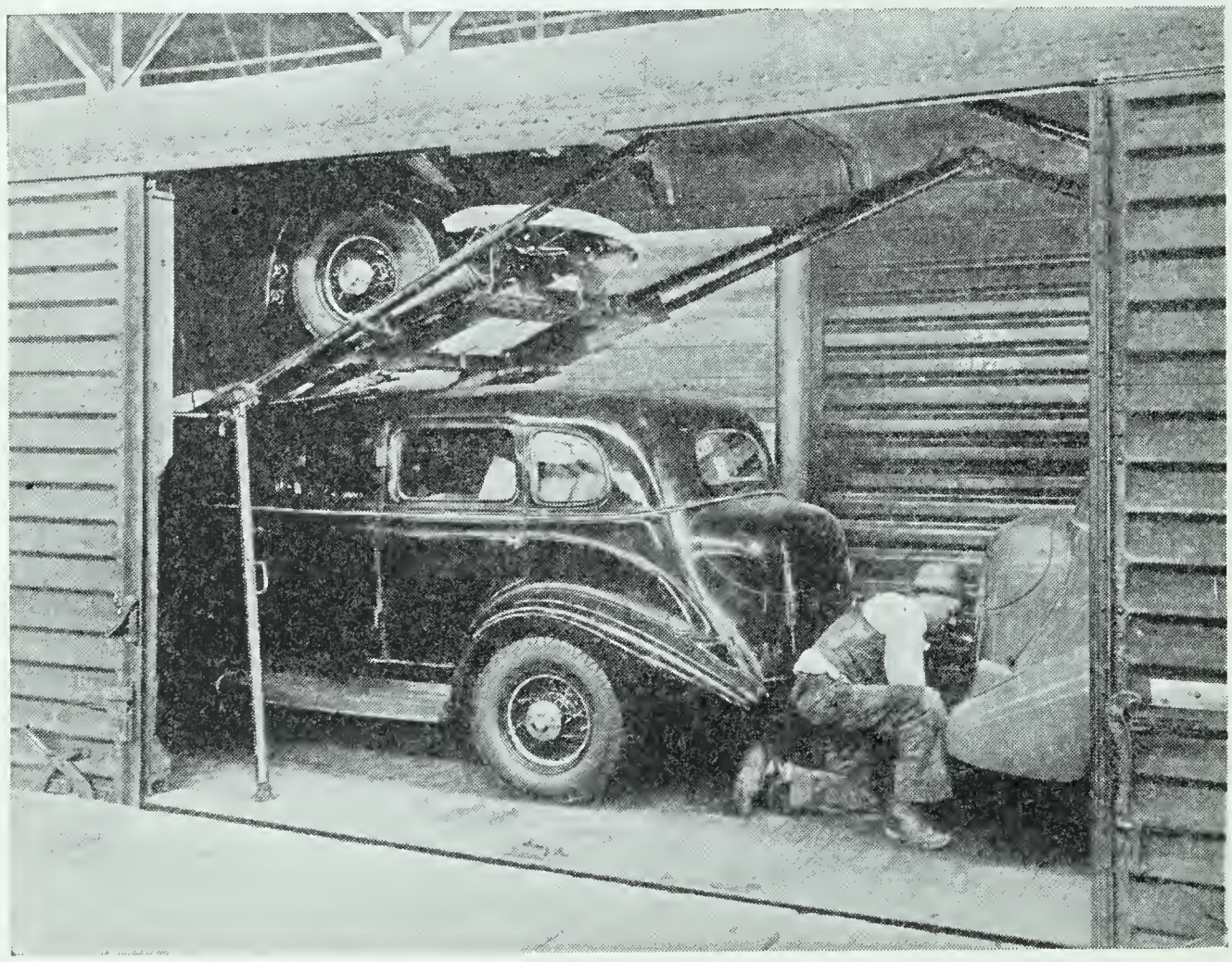
He and another young man went to work. They spent every cent they could raise in experiments. They talked to railroad men about the need of better brakes, until it seemed as though they could talk no more. Not a bit of encouragement could they get. One railroad president said angrily: "You mean to take up my time talking to me about stopping a railroad train with wind? I'd have you know I have something better to do than that."

At last, one of the largest railroads sent a man to see them. "Here is a train," he said, "with an engine and four old cars. Go ahead and fix them up, and we'll see what can be done." But by this time the two boys had no money left. On that point the railroad was not to be

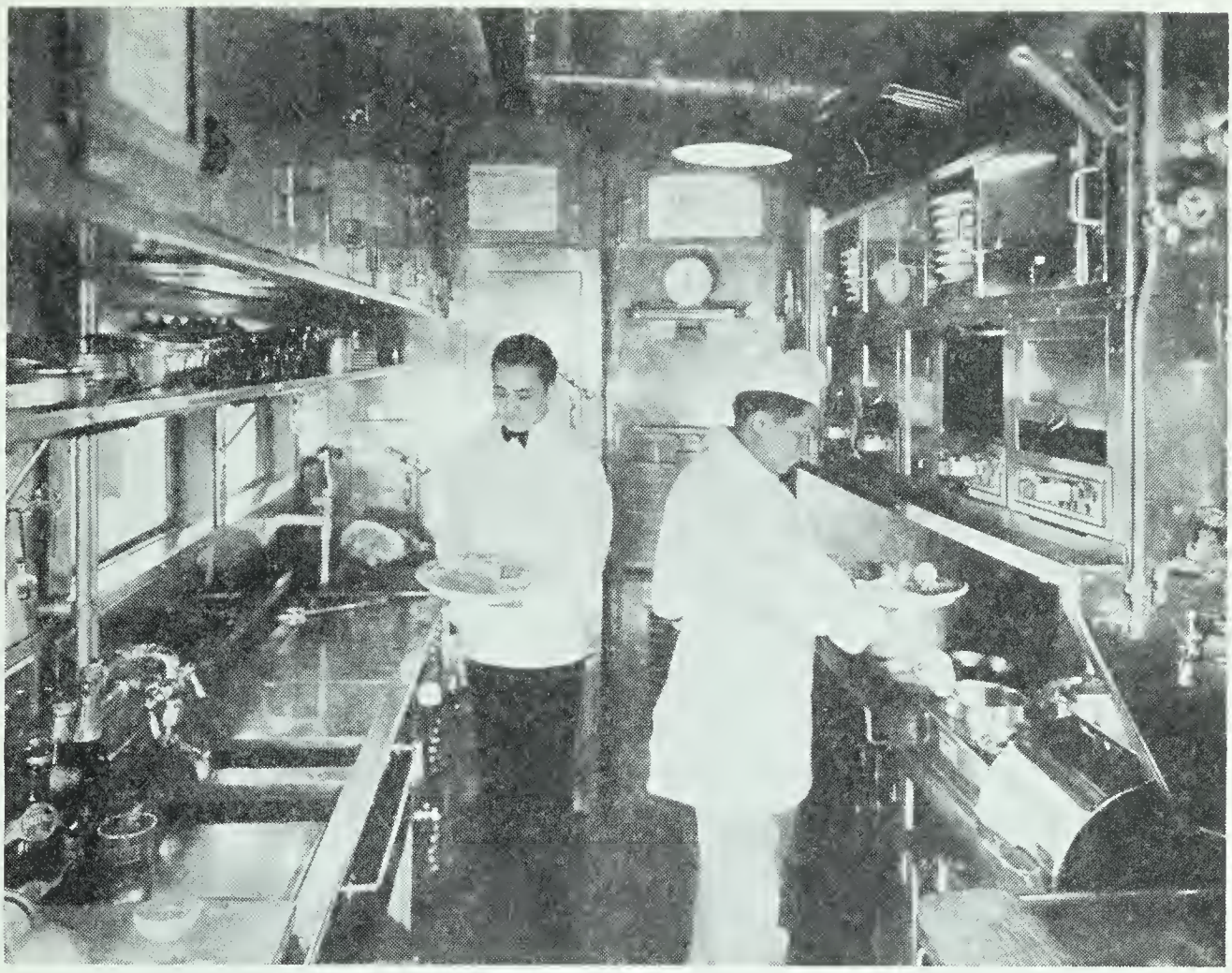
moved. "Not a cent," they said. "We furnish you the train and the track. What more can you expect?"

The two young men scraped up a few lengths of old pipe, and four or five pieces of old rubber hose. They found four metal cylinders into which they could pump air, and picked up an old pump with which to compress it. "Here it goes!" they said, as they used their last money to foot the bill.

There isn't much more to tell. One morning their train was ready for the test. The railroad officials climbed aboard. Westinghouse gave a few last instructions to the engineer. The train started slowly out of the station and across the city streets. It had barely begun to gain headway when there was a terrific grinding of wheels, the train gave a bump



Automobiles Often Travel by Train



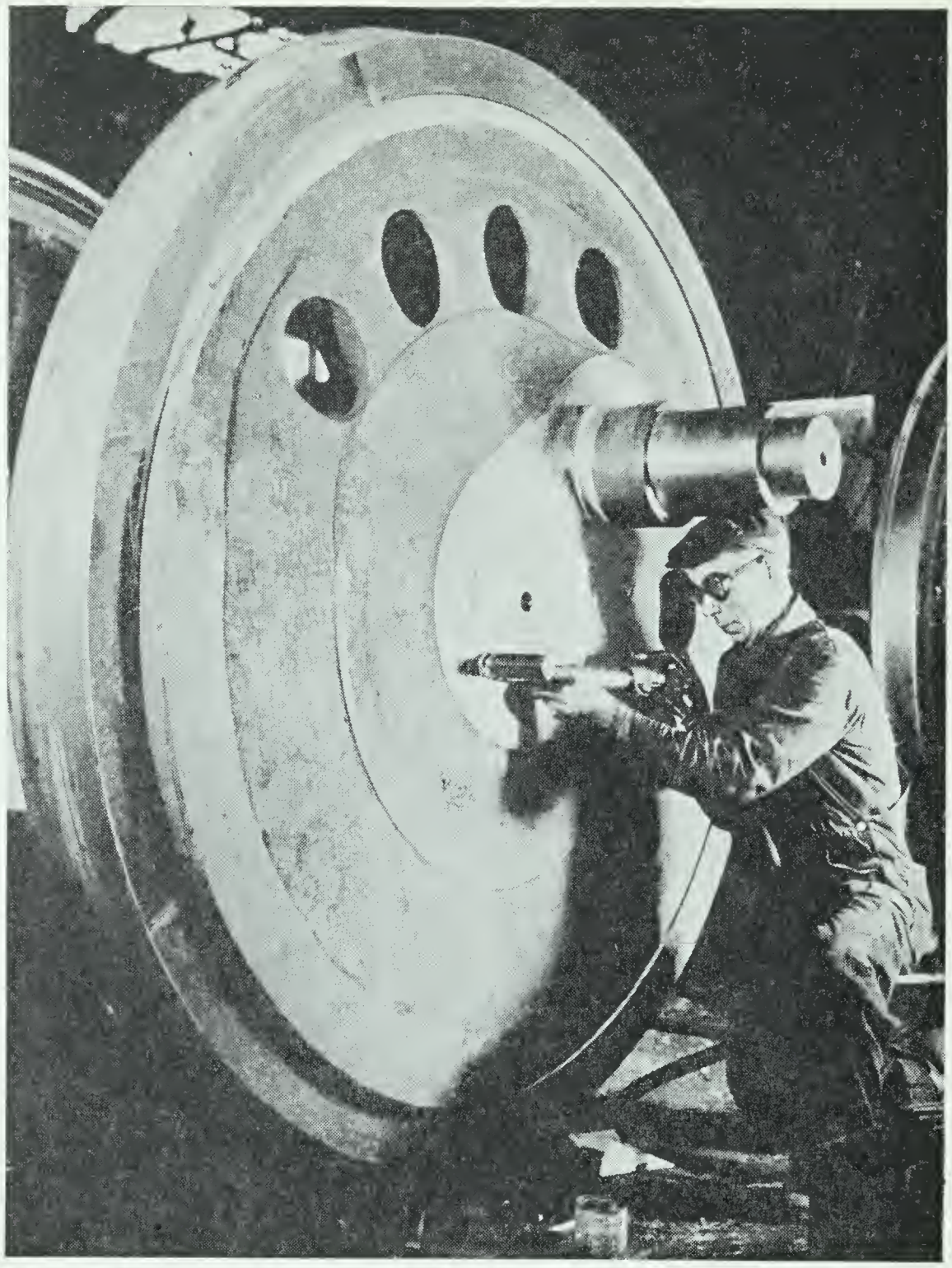
Preparing Dinner for Passengers

and a lurch, the men were thrown from their seats, and the cars came to a sudden and unexpected stop. They ran forward in great excitement. After all the years of waiting, it was clear that something had gone wrong with the new brake.

"What's the trouble?" they cried as they ran.

The engineer laughed. "No trouble at all," he said. "Just as we were about to cross this street, a drayman drove across the tracks. Your brakes saved his life. Did I jolt you very much?"

So we have another chapter of great achievement. Westinghouse was poor and helpless and discouraged a thousand times. But he had kept on going! And now he sensed triumph and victory. The drayman who



Polishing a Streamline Driving Wheel

had thoughtlessly driven across the tracks had come there just in time to help the young man to prove that air brakes will work!

Westinghouse had many a tussle in later years. Many changes were still necessary in his brake. But today we ride safely all over the world because of the man who was determined to stop a train quickly and safely.

Air brakes are greatly improved now. It would take too long to tell just how they work. But this much may be borne in mind—that the brakes were never a complete success until the brakes on the last car of a train took hold at the same instant as those next to the engine. Until that problem was solved, the rear cars would run up against those ahead of them, shoving them on faster, and causing the cars to bump. Now ten cars and an engine, running at full speed, can be stopped within a thousand feet in twenty seconds.

Westinghouse worked hard on this problem. He solved it by a little contrivance called the *triple valve.* If you ever study mechanics, you will see how simple it is, and how automatic it is; that is, able to work itself. With one movement of his fingers the engineer can set the brakes on a train a mile long, and the brakes on the caboose of a freight train will be applied the same instant as those on the first car.

Hand brakes are still used, however, in switching cars and making up trains. The brakeman twists frantically at the wheel on top of the freight car, winding the brake chain tightly around the lower end of the brake rod until the brake shoes grip the wheels and the car is brought to a standstill.

9

And Then They Had to Sleep

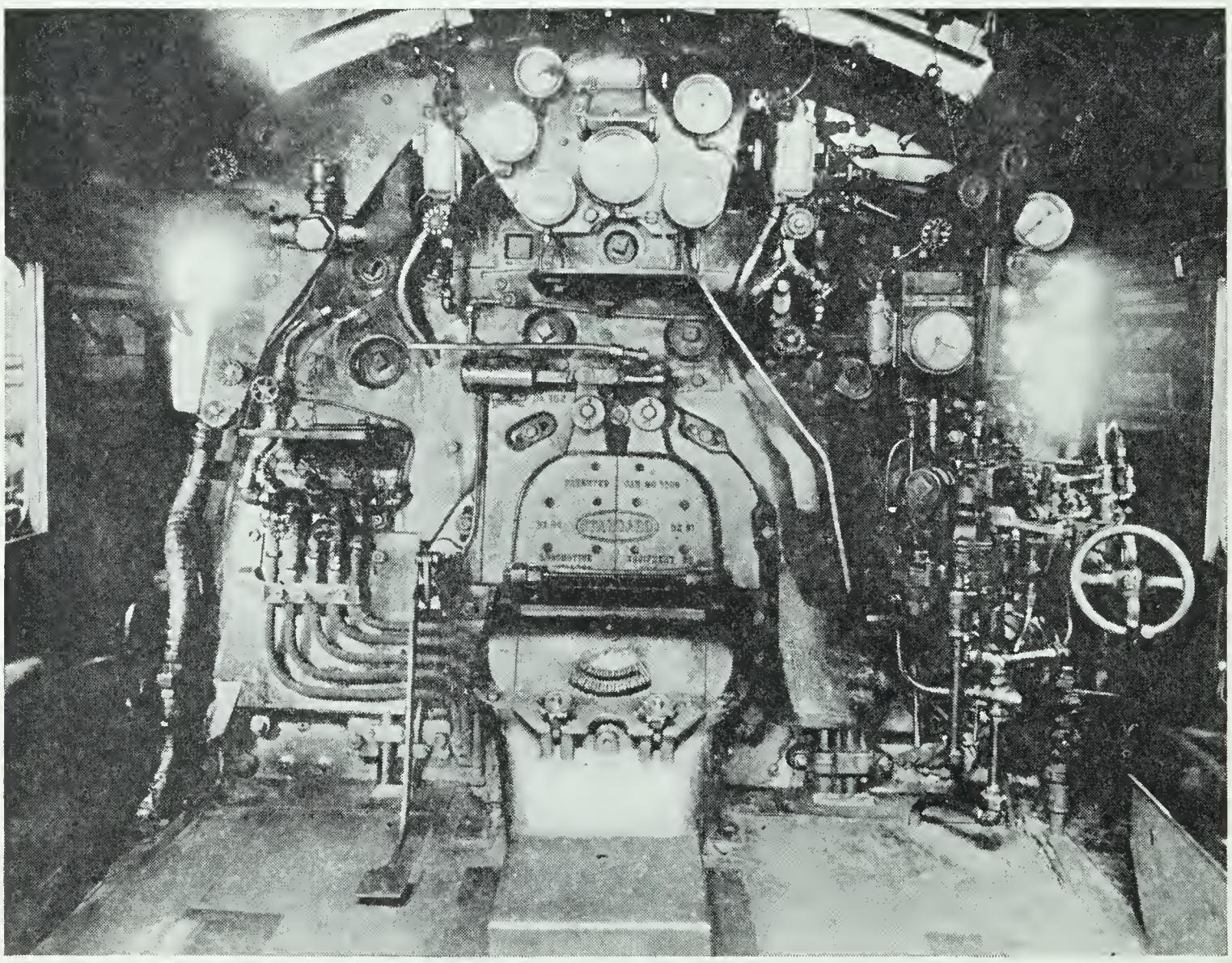
EVER sleep on a train? I don't mean just a short nap in a parlor car or a day coach. I mean in a bed or a berth, when all the lights of your car are out, and you can look out of the window and see the lights of all the sleeping towns flash by, and listen as the porter moves softly down the aisle. It's a delightfully cozy feeling.

Some people who travel a great deal get very tired of it. That is partly because they get homesick, and partly because some people don't sleep as well on the train as in their own bed at home.

Travel is very comfortable, though. The standard American sleeping car usually contains twelve lower and twelve upper berths. It also

contains a drawing room, in which there are a lower berth, an upper one, and a couch which may be used as a bed. In a compartment car, each compartment contains an upper and a lower berth, the compartment being wholly shut off from the rest of the car. This gives a sense of privacy not provided by the heavy curtains that enclose the berths in a standard car. Some trains carry sleeping cars that have real beds and bedsteads, instead of berths, with drawing rooms and compartments, and more comforts than many people have in their homes.

They have ladies' maids, reading lights, a library and desk, barber, bath, a valet to press your clothes, and on some trains a hostess who is



Inside the Cab of the Engine

also a trained nurse. There are electric fans and thermos bottles, heat regulators, and conditioned air; the train is cool and clean, and free from dust and smoke. In the morning the morning papers are waiting for you, and there is a telephone that is connected with the train while it stands in the larger stations, so that a passenger may talk with his friends or send business messages. On most through trains there is a lounge car, or club car, and an observation car. Many roads have given much thought and spent a large amount of money in an effort to add to the comfort of the day coaches and reclining-chair cars with which some trains are equipped. Never were railroad trains so clean, so noiseless, and so comfortable as now.

In the early days that we have been writing about, comfort, quiet, or cleanliness on a railroad train were out of the question. The seats were hard and straight, the aisles narrow and dirty, the windows small, the light poor, and the smoke, cinders, and rattle of the train almost more than the passengers could endure. When trains began to run at night this was especially true. There sat the poor passenger, on a narrow, high-backed seat, while the train jerked and pounded, or started and stopped; the long night seemed well-nigh endless.

Then appeared a man who believed that travel should be with comfort and at ease. Like Stephenson and Westinghouse, his first name was George—George Mortimer Pullman. He was a cabinetmaker, and very proud of his good cabinet work. Stephenson had made railroad trains *go;* Westinghouse had enabled them to *stop;* and now Pullman proposed to make them more pleasant to ride in. He believed that more people would travel if they could do so in greater comfort.

At this time a good many railroads were being built in the newly

settled country along the Mississippi River. Most of them were headed west, connecting with the steamboat traffic which was very heavy on the river in those days. At such towns as St. Louis, Galena, and Alton there was a great deal of freight. One road—the one on which the *Pioneer* was run—was headed for Galena, where there were large lead mines, and where fifteen or twenty steamboats were tied up at the wharves at one time.

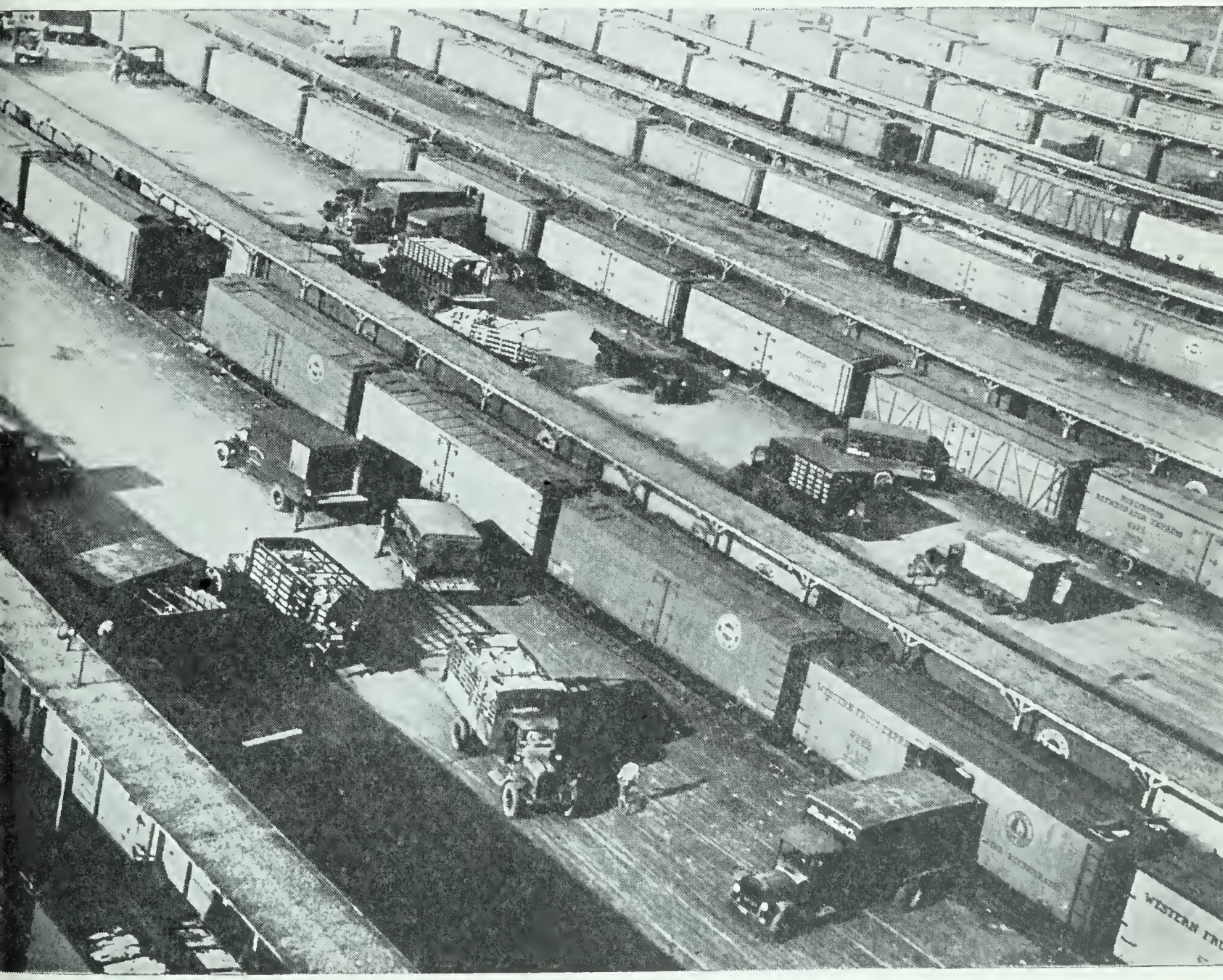
Another such town was Alton, which was going to be bigger than St. Louis—its people said. The legislature of Illinois was ordering many railroads and canals to be built; so the people at Alton persuaded the lawmakers not only to build one railroad in their direction, but three of them! One of these—the Chicago and Alton—carried an unusually large number of passengers. Mr. Pullman believed that this profitable business could be increased if the passengers only had some place to sleep in on the train. He therefore persuaded the officials of the road to let him have two of their old passenger coaches, with the understanding that at his own expense he would fit them up as sleeping cars.

At that time, no one had ever heard of sleeping on a train. It seemed to most folks to be a very foolish piece of business. What if the train ran off the track, or was struck by another train? If an accident should occur, wasn't it bad enough to travel after dark, without taking off your clothes? There was quite a good deal of discussion and complaint, while Pullman went ahead and fitted up his two cars.

He put hinges on the backs of the seats, so that they could be let down flat, to form part of the bed. On the little bed or platform that this made, they gave the passenger a blanket, hung curtains around him, and let him go to bed as best he could. The upper berths in the

first sleeping cars were beds let down from the ceiling by pulleys and ropes, and drawn up again in the morning, when the passengers had gone.

They were desolate-looking little sleeping cars. There was no smiling porter to look after the wants of the passenger. The windows were about one foot square; there was a wood-burning stove at each end of the car for heat; and there was a candle at each end of the car for light. There was a tin washbasin, too, in which the people might bathe their



Unloading Cars Filled with Fruits and Vegetables

faces and hands when they arose. But there was no one to shine your shoes, no carpet on the floor, no curtains to shut out the night.

The ceilings were so low that a tall man must stoop in order not to bump his head. But the cars were so far ahead of anything that had ever been known up to that time, that passengers flocked to them at once.

Sleeping on a train was a new notion, of course, and the passengers weren't always as courteous as we think people should be. Many of them were unwilling to take off more than their outer clothes, and there was a good deal of trouble with men who wanted to go to bed in their boots. They just couldn't seem to understand that anyone could risk riding on a railroad train barefoot and undressed.

But in spite of all their shortcomings, the two old cars were a great success, and Pullman finally found money with which to build what he called a *real* sleeping car. It cost him eighteen thousand dollars—all he could rake or scrape together. He christened it *A Pioneer*—not *The Pioneer*. For in his dreams of the future he could see, or he thought he saw, that this was only one pioneer of many that he had in mind to launch in the days to come.

In this new car a number of improvements were at once noticeable. One of them was that the upper berths that had been let down from the roof on ropes in the first two cars, were now on hinges, so that they closed up, much as they close in the sleeping cars of today. The new car was built with a higher ceiling, too—two and one-half feet higher than passenger cars had been built up to that time. Nor did Pullman's changes and improvements stop there. He built the car *wider,* also. That meant that a most daring step had to be taken. For

there was probably not a railroad in the whole country over which such a car could be run without first moving station platforms, and raising and widening bridges so that the car could pass.

On the new car the lighting and heating were greatly improved. There were carpets on the floor; the berths were supplied with clean, white sheets; and the wash-rooms were beautifully fitted up. A colored porter was on hand to look after the traveler's comfort.

From that time to the present the advance in travel comfort has been steady. As additional cars were built, curtains were placed at the windows, mirrors on the walls, and wooden partitions between the berths. For those who sought greater privacy, drawing rooms were placed in many of the cars, and compartment cars were developed,

Hauling Heavy Freight

where each pair of berths is in a small compartment, like a room, instead of being open during the daytime so that it is a part of the whole car. On European roads all the sleeping cars are built so that the berths are placed in separate compartments. On our American roads most of these cars are of the open type; but we are leaning more and more to the compartment idea.

When the porter clears up the beds in the morning he stores the pillows, mattresses, and blankets in the upper berth, and lays the light, wooden partitions that are used to separate the berths flat among the blankets. The sheets and pillow slips are gathered up in bags and sent to the laundry. The upper berths, closed for the day, form part of the handsome finish of the car.

Not content with the advance in sleeping arrangements made by his cars, Pullman began to plan dining cars. At first these were known as *hotel cars*, in which the passenger could sleep, eat, and lounge about, all in the one car. Then he designed for use on trains that ran by day, instead of by night, luxurious parlor cars.

The first two old cars on the Chicago and Alton were built in 1858; *A Pioneer* in 1864; the first dining car, known as the *Delmonico*, in 1868. By this time, it was seen that the lighting arrangements were quite far behind the other arrangements for comfort, and the Pullman Company built the first electric-lighted car. It was what might be called an international affair, for it was on an English train, in an American Pullman car; and the lights were fed by French electric storage cells. This was in 1881.

American railroads are very proud of their dining car service. On trains that run long distances the diner is a very important part of the

service. The first diners were built, owned, and operated by the Pullman Company; but many roads now operate their own.

With the use of dining cars, came the need for continuous trains. Many people disliked to cross the open car platforms as they went from car to car. Nor was it safe to do so. So in 1886, the first Pullman safety vestibules were built. They were a great protection both to the passenger and to the train itself.

The first train vestibules, like the car interiors of that day, were

The Famous Horseshoe Curve in the Alleghany Mountains

highly ornate. They were narrow, occupying only the width of the platform above the steps. Today, by an arrangement of trap doors, the space over the steps is also made use of, so that the vestibule is the full width of the car. The modern vestibule serves several purposes. It gives steadiness and stability to the moving train. It helps the cars to withstand shock, and it affords a safe passage between cars for passengers on their way from one part of the train to another.

During all this advance, railroad trains were growing heavier, locomotives more powerful, time schedules shorter and the distances covered by through trains much greater. This made it necessary that the Pullman cars should be able to run over various railways without change. There wasn't much point to riding in a sleeping car if in the middle of the night the train should reach the junction with another railroad on which the track was of such a gauge that the car couldn't run on it. Thus many roads were forced to change their gauge so that soon they were all of what is known as standard gauge.

Today, with streamline trains, built of such lightweight metals that unheard-of speeds are attained, and so designed that the whole train, engine and all, is in one unit, much that was done in earlier years sounds strange to our ears. But a beginning had to be made; someone had to say for the first time that railroad travel must be not only speedy and safe, but it must also be surrounded with all the comforts of the finest home. It was to the development of this idea that George Pullman devoted his life. He was but one of many who have worked and devised and planned, until today travel comfort is taken as a matter of course.

In Europe, in Asia, in Africa—everywhere, railroads have sleeping

cars, dining cars, and other travel comforts. One may travel for days across Russia, over the bleak Siberian steppes, visit the magic of old Bagdad, or ride across darkest Africa, eating and sleeping in comfort as the train moves on.

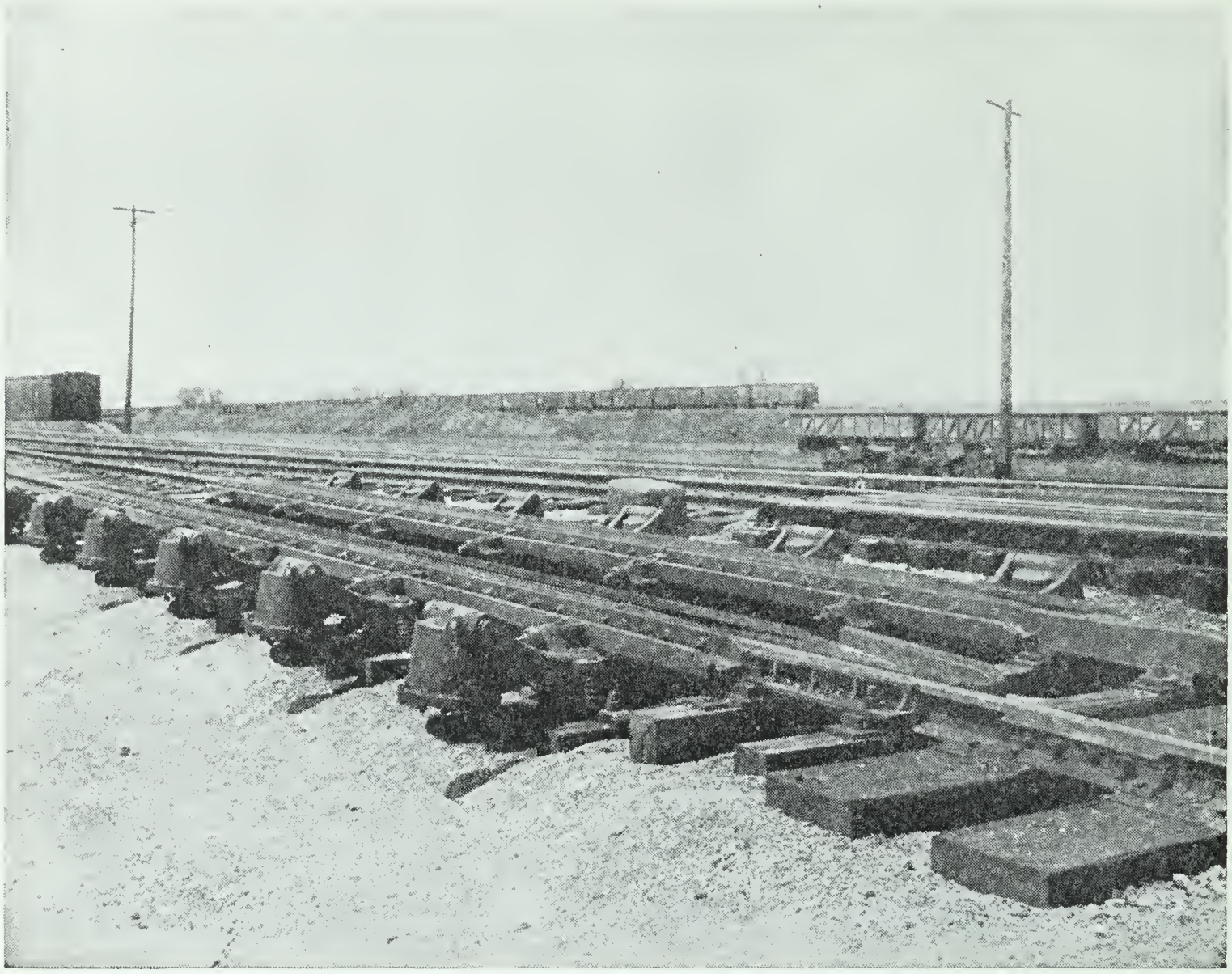
In each land the customs, to be sure, are different. You may lunch from an English tea basket or drink tea from a Russian samovar. You may dine in a French corridor train or sleep through Austria on a *wagon-lit;* but no matter where you are, you will still find our world growing ever smaller because of what these men of the railroads have done to make travel easier.

10

Twinkling Lights

HAVE you ever looked down on the twinkling lights of a big railroad yard at night? Across the gleaming tracks flash scores of swinging lanterns, and you hear the cough of the busy switch engines, as you watch, where green and red lights are blinking and twinkling and changing as the engines move about.

Now and then there is a sudden roar beneath you; a through train rushes down the main track, the passengers reading, talking, and laughing in the brightly lighted cars. Far down the line the train speeds, growing dimmer and dimmer in the distance, until you can mark where the fireman opens the fire door, and see the flare die down



Retarder Used to Slow Up Cars in Classification Yard

as he closes it. In the distance the red lights come on, one here, another there, and another farther on, as the train goes whirling through the night, past sleeping towns and villages, safe in the sure protection of the twinkling lights.

Not so many years ago no one thought of riding on a railroad train after dark. When dusk came, the engineer stopped, the passengers got out, and not until morning did the wheels turn again. Before the railroads could be ready for night work there were many things to be provided—better engines, better tracks, better cars—but more important than all was the need of some way in which to keep track of

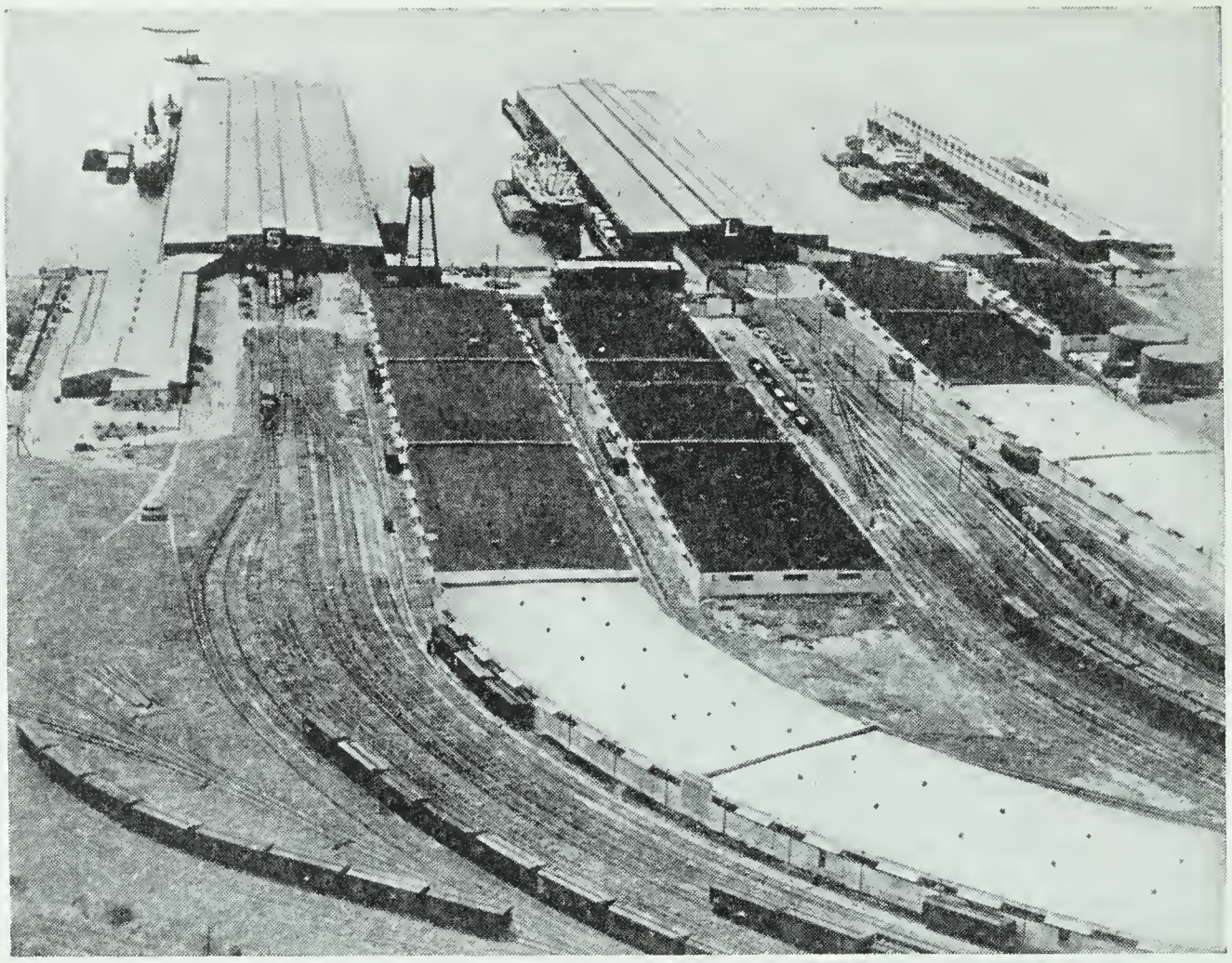
the trains, and some way by which the engineer might know that the way was clear for him to go ahead without suddenly coming face to face with another train.

At first, all of this was secured by the use of the system of telegraphic train orders described in Chapter 7. But no sooner were such orders inaugurated than it was seen that some means of delivering them must be arranged. For the station agent merely to go out on the platform and wave his arms at a passing train didn't always work. If the train was heavy and the engineer wanted to make the next grade, the crew were likely to wave derisive hands at the agent and drive right ahead.

At each station, then, a board was put up, called a *block-board*, set upon a high post and painted red. The trainmen were told that when this board stood out straight, like a man holding out his arm, they were to stop, whether they liked it or not. When night came, a red lantern was hung at each end of the board, and they were to stop when the lanterns hung horizontally, showing that the arm was set at danger.

All this was very cumbersome. Sometimes the agent forgot the signal and the train went roaring by. This would never do. Trains were growing more numerous; schedules were faster; engines and cars were heavier and the dangers of travel greater. Something had to be done to handle most of the trains automatically.

For this, the automatic electric block signal was invented. These signals divide the railroad up into "blocks," or sections, all under the control of signals at each end of a block. When a train approaches, the wheels, by contact with the rails, close an electric circuit which causes the semaphore arm to rise, or turns a disk or a lantern to red, warning all trains that may be following. The signal remains at red until the



Docks and Loading Sheds

train has passed through the block, when the current is once more restored, and the signals turn to safety.

Sometimes the engineer finds the signal ahead of him showing green, instead of red. That means he must approach with caution. He can enter the block, but only with his train under full control; the next block is likely to show red.

A block may be almost any length, from a hundred yards or so up to a mile or two. This length depends on the amount of traffic and on the presence of tunnels, bridges, and railroad yards, or of other railway lines, calling for unusual caution.

When the weather is stormy and the night dark, engineers now and then run past signals. Because of this danger, some roads place a red

signal in the cab, and when another train is just ahead, or danger approaches, a red light shows just at the engineer's head, warning him to stop. A device has also been invented that goes even a step farther, and automatically stops the locomotive.

An interlocking device is an electrical arrangement that is different from the block signal in that it is meant to protect trains by keeping

A Modern Railroad Bridge

them out of one another's way at points where one road crosses the tracks of another, or in railway yards where tracks cross or converge. With the tracks and switches set by the towerman at such a crossing, a train can proceed on only one track. A train approaching from the other direction would be derailed—thrown off the track and stopped, thus protecting the train that has the right of way. In a large railroad

yard, all the tracks that intersect are automatically locked, so that one train may not get in the way of another.

In the tower overlooking the yard is a long line of levers or of electric buttons, each connected with a switch that governs a junction of two tracks. Before the towerman hangs a long board, something like a mirror, all laid out with tracks and trains in miniature. The board gives the towerman a perfect picture of the trains weaving back and forth in the yard below. On its little tracks are small lights, each representing a train, running or standing still just as the trains are doing down below.

When the towerman wants to move a certain train, he presses the proper buttons or moves certain levers, and switches are thrown, signals set, and the train proceeds. Today most of this is done by electricity. Some of it is still done by the use of compressed air. Electricity and air pressure can throw switches that are a mile or more away. That is how the towerman at a railroad crossing or in the tower that controls a great railroad yard throws the tracks and sets the signals so that each train, swiftly and without confusion, moves to its appointed place.

Freight trains, on approaching a great city, stop at what is known as the *classification yard.* Here a switch engine pushes the long string of cars slowly up to the top of what is known as the *hump.* From the hump each car rolls down an easy grade into the maze of tracks that form the yard. In a tower beside the hump the cars are listed and the switches ahead of it are shifted by electricity so that each car slips into the siding on which others wait that are headed for the same destination.

Freight trains are interesting things. Where do they go? Where are

they from? What do they contain? Notice the letters on the sides of the cars—B&M, A&WP, WNC, NP. Each tells the story of a far-flung empire of farms, factories and towns. Today many freight trains have names—*The Hammer, The Cannon Ball, The Man o' War.* They run on fixed schedules, arriving and departing as closely on time as the through express.

Grade Crossings Are Well Guarded

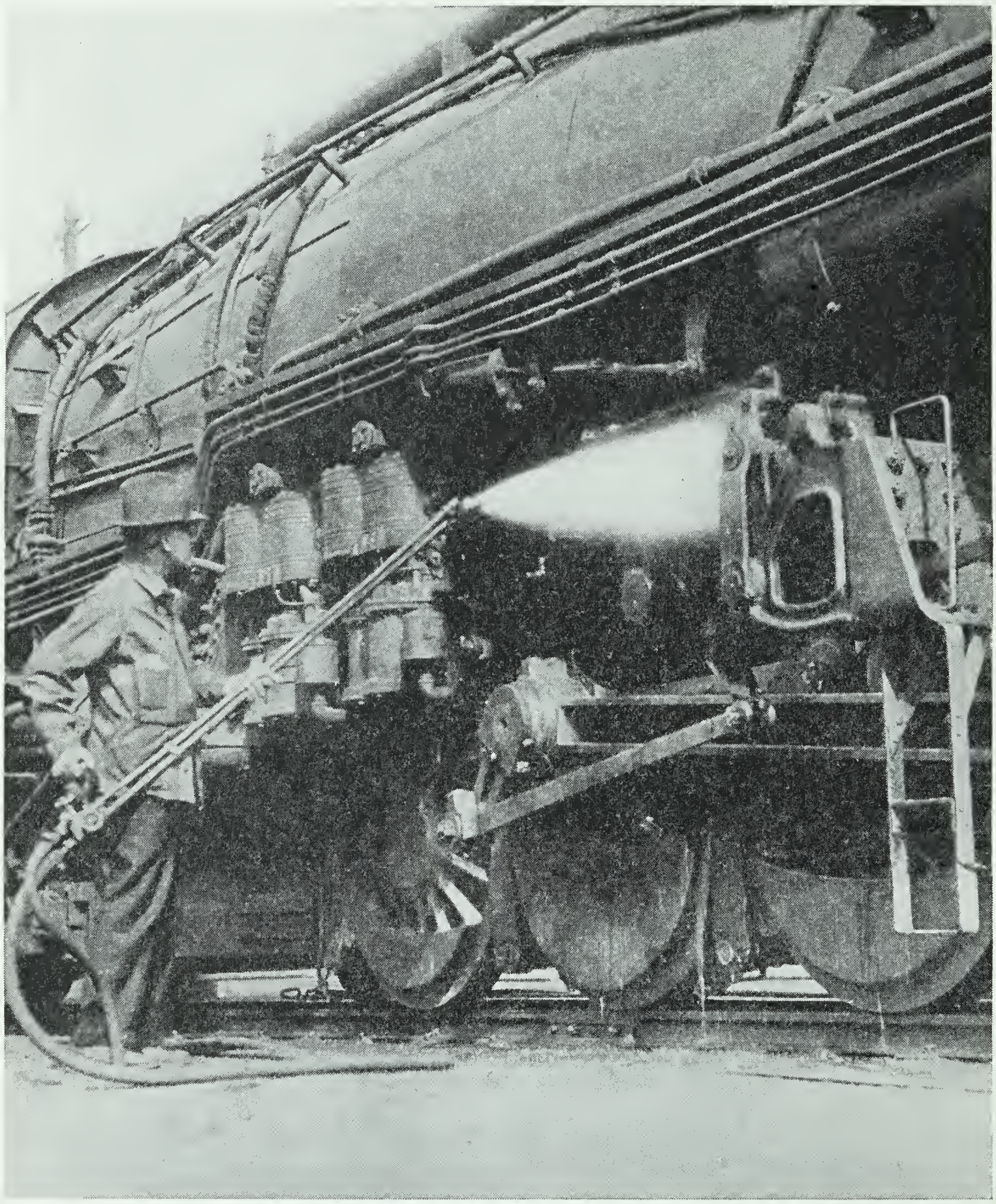
11

Railroads of Today

THE railroads of today are able to render their splendid services because from the beginning to the present time they have never ceased building, improving, and changing. Those first roads couldn't even run a train after dark until they had better engines, better cars, and better tracks; so they quickly proceeded to get them!

The old stagecoaches which they first used for cars had to be changed into longer, broader, stronger, and more comfortable vehicles, until we have the streamlined, air-conditioned, smooth-riding cars of today. Similar changes had to be made in a hundred different ways. Both better engines and better tracks were needed; airbrakes were

called for; and the telegraph, block signals, and stronger bridges all followed in time. Higher speeds called for better roadbeds and heavier



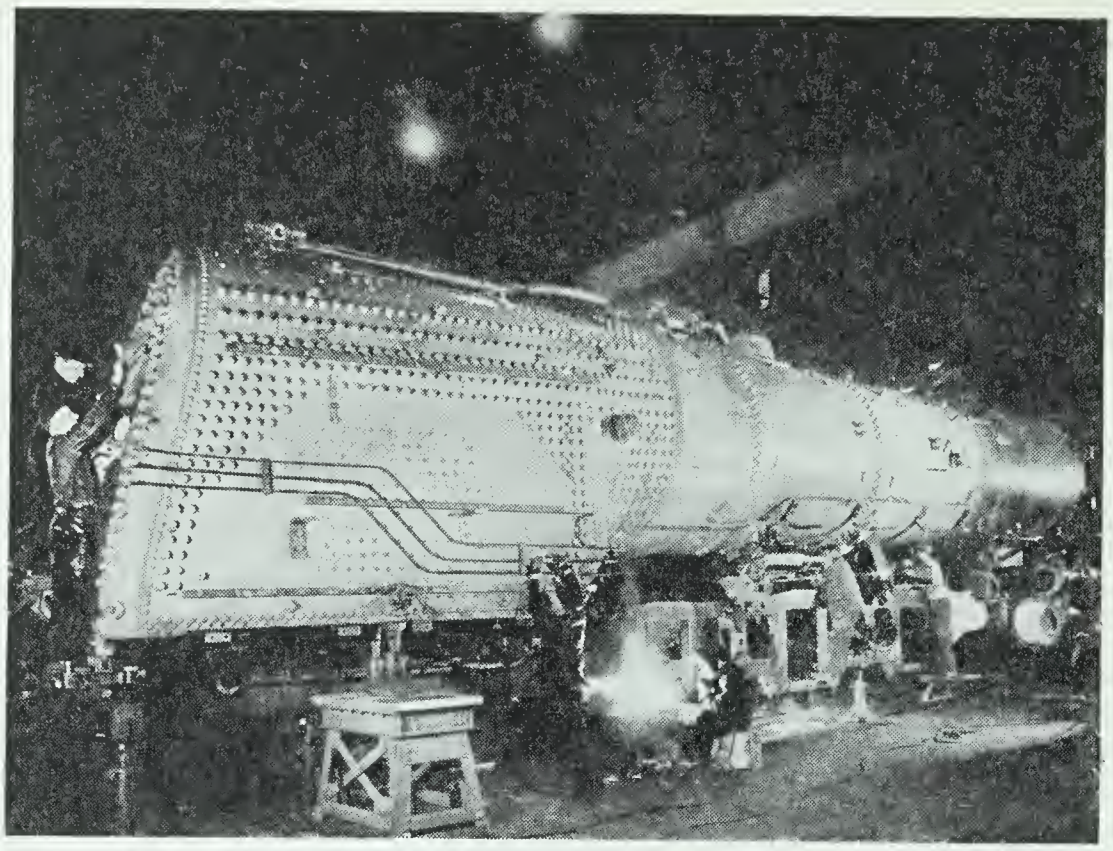
Cleaning His Engine

rails. Never, since the day that the first road was built, have the railroads ceased to improve all of these things.

First it was a question of track. The light wooden rail on which only the lightest of equipment could be used, didn't last long. It couldn't stand up under the strain. Nor did the builders know how to lay even this light track. Many of them sank wooden posts upon which to lay the crossties. Others put in small foundations of stone on which the ends of the ties were laid. Others hewed out long pieces of limestone to use for rails in place of the wooden timbers. On these limestone blocks the builders cut a groove in which the strap-iron rail was securely bolted. The strap-iron rails on the first roads had a habit of warping and curling up at the ends in hot weather. These upturned ends were called *snake heads*. They were very likely to cause wrecks.

In New York State a road was planned which was to run from the Hudson River to Lake Erie, to be known as the *Appian Way*. For this road, it was planned to erect wooden posts, or piling, on which the track was to be laid. This piling was actually set up for a distance of over a hundred miles, and at a cost of more than a million dollars. But no track was ever laid. The route over which this fantastic highway was planned is now a part of the Erie Railroad.

With the passing of strap-iron construction, rails were next made of cast iron. But being very brittle, they had a way of snapping off, especially in cold weather, usually right under a train. Wrought iron came next; save for the expense, it served its purpose very well. On his first railroads Stephenson used rails that had a flange on the outer edge. Today the flange is placed on the inside of the wheel, instead of on the rail.



Building a Steam Streamliner

Then the Bessemer process of making steel was announced in 1856. Before that time, steel was produced only in small quantities for use in making scissors, knives, razors, and small tools. Now it could be produced in large quantities. So in 1865 the first steel rails were rolled.

These were much the shape of our present rails. The first ones weighed from thirty to fifty pounds to the yard. In other words, a piece of rail thirty-six inches long contained thirty (or fifty) pounds of steel. But today? The weight has increased steadily, until a rail laid on the main lines of the great roads weighs anywhere from a hundred to a hundred and fifty pounds a yard. As a standard rail is sixty feet long, it will be seen that it weighs anywhere from three tons up, and it takes fifteen or twenty husky trackmen to handle one of them.

The shape of the rail of today is something like an inverted letter T. Hence it is known as a *T-rail.* Robert L. Stevens, son of John Stevens (who built the first circular railway in the grounds of the Stevens In-

A Modern Control Car

stitute of Technology, in 1825–1826), whittled the pattern for the first T-rail out of wood, on his way to England to buy rails for one of the American roads. Its shape has not been greatly changed since that time.

Before the rail is laid, its quality must be carefully tested. A chemist who is also a metallurgist takes small samples of the steel and tests them, trying each sample for strength, resiliency, and impurities. For a rail may fail in several ways. The steel may be too soft, or too brittle, with not enough spring or give to it. It may have defects that are due to poor supervision in rolling it in the steel mills. Or it may have in it too much or too little of such things as manganese or phosphorus.

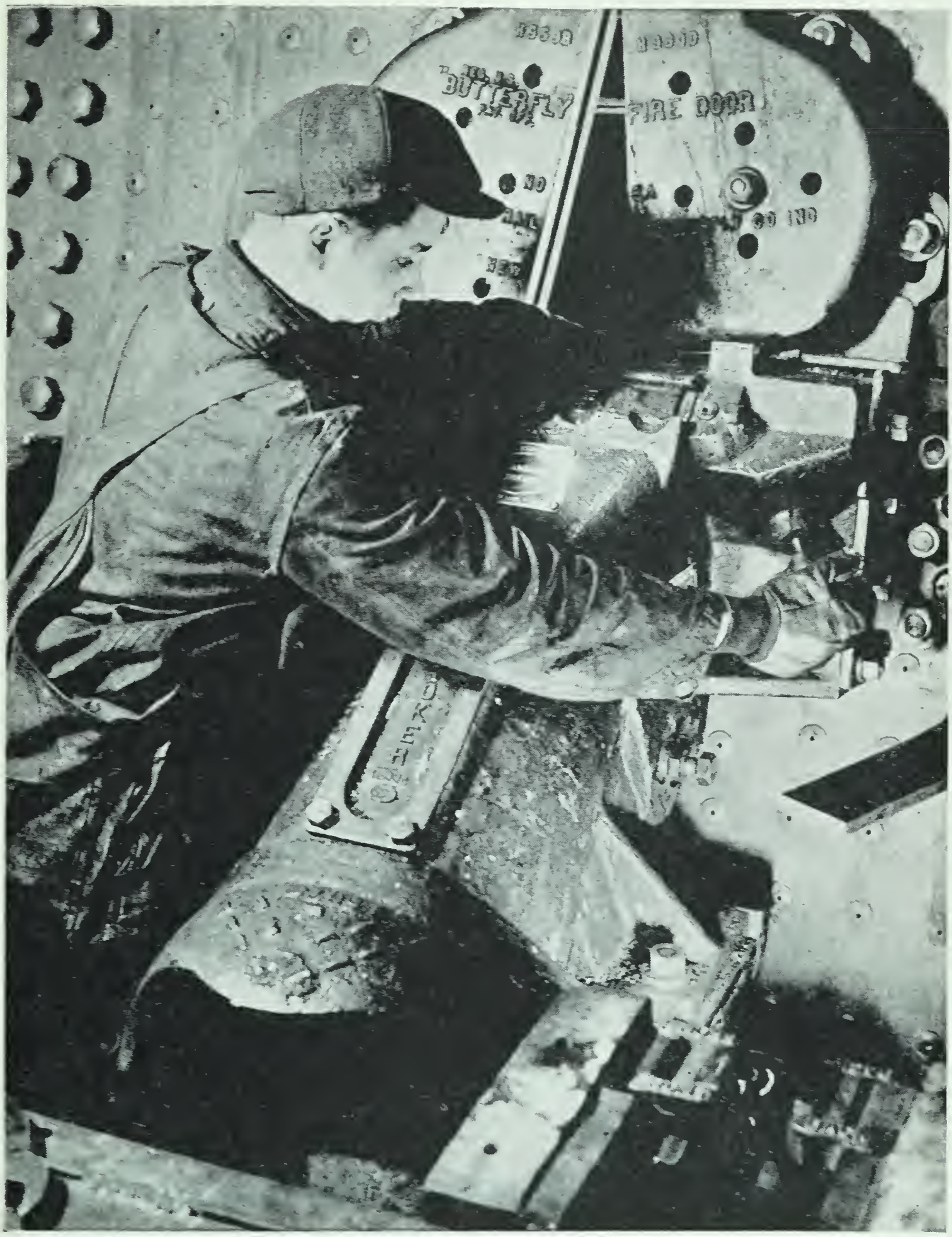
When the rail is laid in the track, it is watched and cared for as if the well-being of the whole railroad depended on it. Laborers level the roadbed, drain it, and keep it clean; trackwalkers patrol, inspect, and guard it. A swinging lantern in his hand, track torpedoes in his pouch,

his oilskins dripping, and his eyebrows wet, the trackwalker is likely some night to stop your train; holding his lantern high beside the panting locomotive, he will tell the engineer of a weakened piece of track, a bridge gone out on the flood, or a broken rail, snapped by sudden cold; while you back there in your Pullman berth, quite comfortable, sleep right on and never know it.

The track torpedo is a small flat metal box which slips over the head of the rail and is held in place by metal clamps. It contains an explosive that does no injury, but *detonates*, as we say, when the wheels of the engine strike it. It is used by trackmen to warn an approaching train. As the wheels strike the first torpedo and it explodes, the engineer is warned of danger—a wash-out, or fallen trees, or a landslide. A hundred yards farther on, the trackman places *two* torpedoes, and these, exploding in quick succession, warn the engineer to bring his train to an immediate stop.

Then there is the roadbed on which the rail is to rest. Heavy oaken crossties are embedded deep in a bed of crushed stone, built to act like a cushion—firm, yet ready to give gently under the tremendous impact of the moving train. The standard crosstie is of hewn oak, 8 inches thick, 10 inches wide, and 8 feet long. Oak being scarce, various other woods are used. The ties are put through a preserving process by dipping in a preparation of creosote before placing them in the roadbed. Standard track on main lines calls for a thick bed of screened crushed stone, flush with the ends of the ties, the sides of the roadbed sloping down at an angle of forty degrees.

Then about bridges! There always have been bridges. Ever since the cave man found the first natural arch of stone over a ravine, men



A Youthful Mechanic

have used bridges. But railroad bridges have developed until today they are one of the marvels of engineering skill.

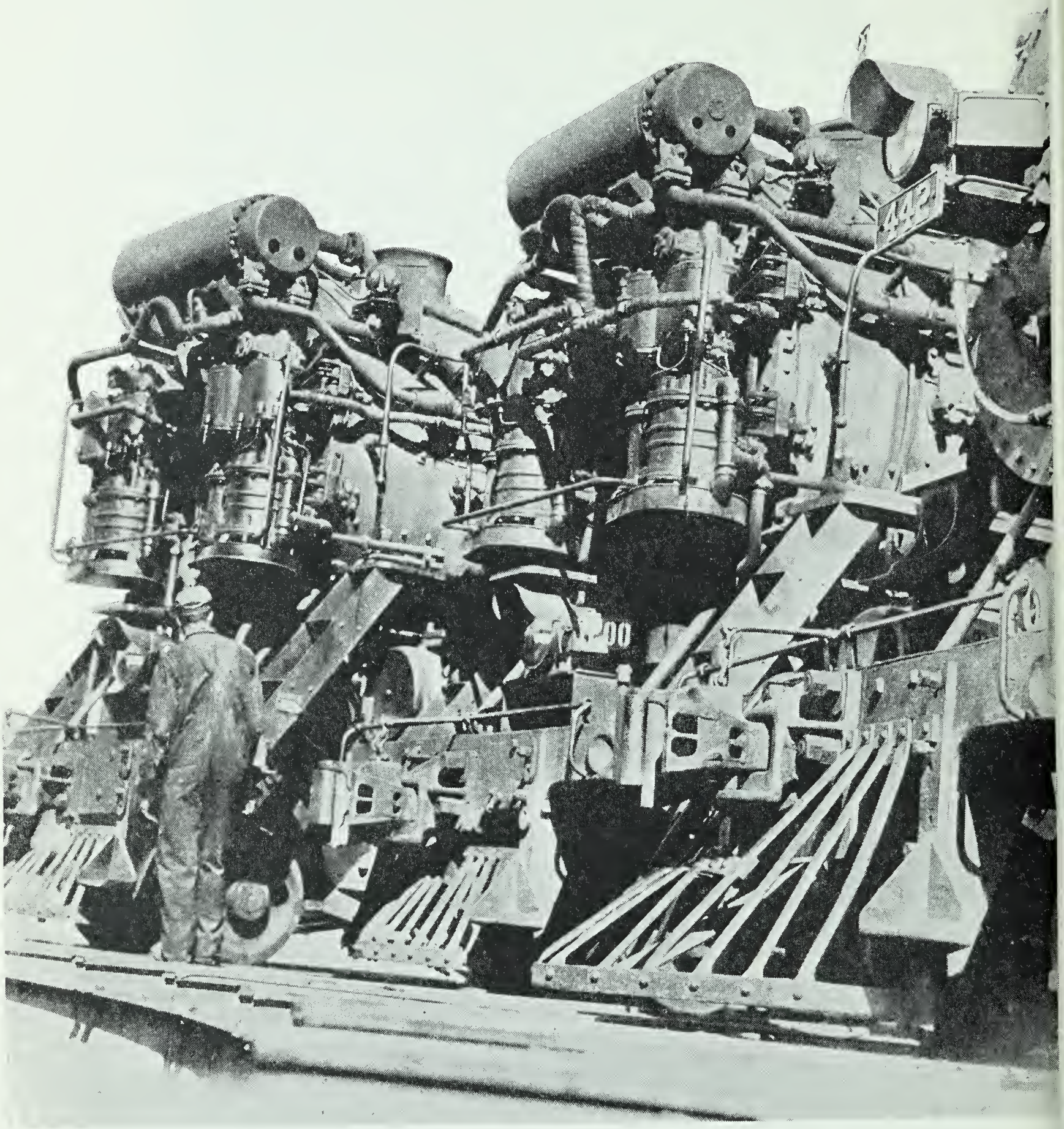
So with the question of bridges, tracks, and trains nearing a point that might be called perfection, the problem of safety for passengers and crew early forged to the front. Not only were the roads constantly improving their system of telegraphic train orders, the use of automatic block signals, the building of steel cars, and the use of air brakes, but with the increase in traffic came some remarkable changes in motive power, and in the way it is handled. Not only have the locomotives grown tremendously in size, but they have come to be highly complex machines. In the early days of railroading the engine had only one job: that was to pull the train. Today it does many things. It furnishes steam to heat the train; compressed air with which to stop the train; and superheated steam with which to run the train. It rings its own bell. It feeds its own fire, eating up fifteen or twenty tons of coal on an ordinary run and feeding that coal into the firebox by means of mechanical stokers. The fireman doesn't have to handle the coal at all. In the old days, a locomotive had no bell, no whistle, no sandbox, and no headlight. Today it has all these things and more.

In the early days it was the engineer who determined when the train was to stop and start. The story is told of an obstinate conductor who hung a stick of firewood over the engineer's head, attached to a rope that ran back into the train. "When I pull that rope, you stop," the conductor said, "or there'll be trouble." The engineer stopped.

Later on, a small bell or gong was placed in the roof of each cab. Today the bell rope is gone; instead of it the conductor pulls the cord to a signal worked by compressed air. It seems like a small change as

A Luxurious Club Car

Building Streamline Locomotives



Three Giants

we now look back, almost as unimportant as the passing of the old lookout posts and the fights over the use of the tracks. But it is all a part of the growth that has made railways what they are today.

There has been great improvement in the manner in which the cars of a train are coupled together. The long chain used in the time of *Little Black Nose* gave way to the "link and pin." It was a jolting, rat-

Modern Locomotive Terminal with Turntable and Roundhouse

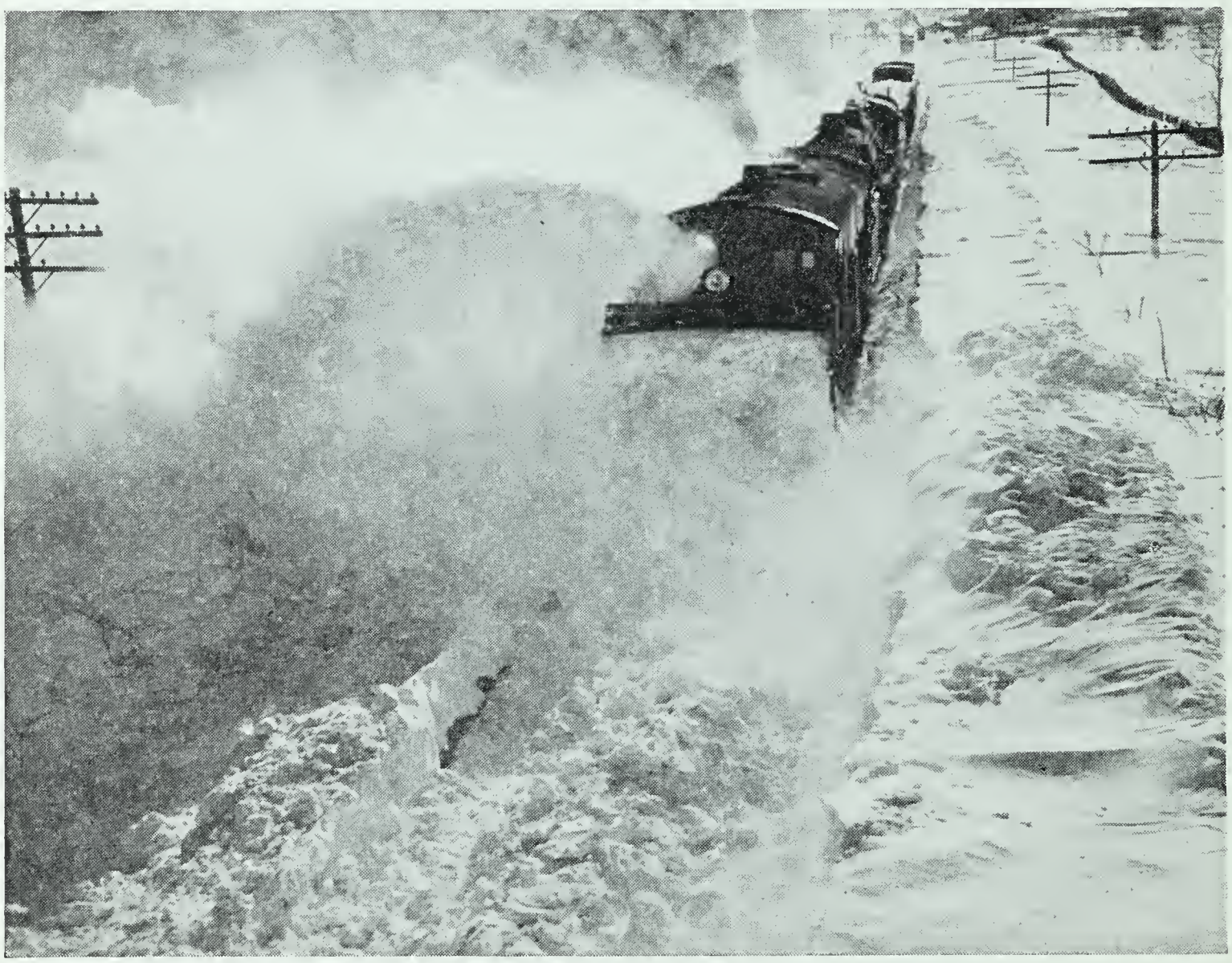
tling, noisy device, and a dangerous one, too. It was finally succeeded by the automatic coupler. The riding is much smoother and the safety both of passengers and of the train crew is greatly increased.

As to the locomotives all this growth centered around them. The *Rocket* weighed only four and one-half tons; the *Pioneer* weighed

seven. The *De Witt Clinton* didn't weigh as much as a pair of driving wheels weigh today. A fairly good-sized engine now weighs sixty or seventy times what the *Rocket* weighed. In fact, a big Mallet Compound, with tender, water, and coal, *weighs over a million pounds!*

In the old days an engine had four wheels, or sometimes six. Today we have *decapods,* great giants with *ten drivers!* The Mallets are really two complete engines—driving wheels, cylinders, and all—which share one boiler and are run by only one engineer.

Nowadays we have Atlantic, Pacific, and Mountain types of engines, each known by the number of its wheels. We also have locomotives

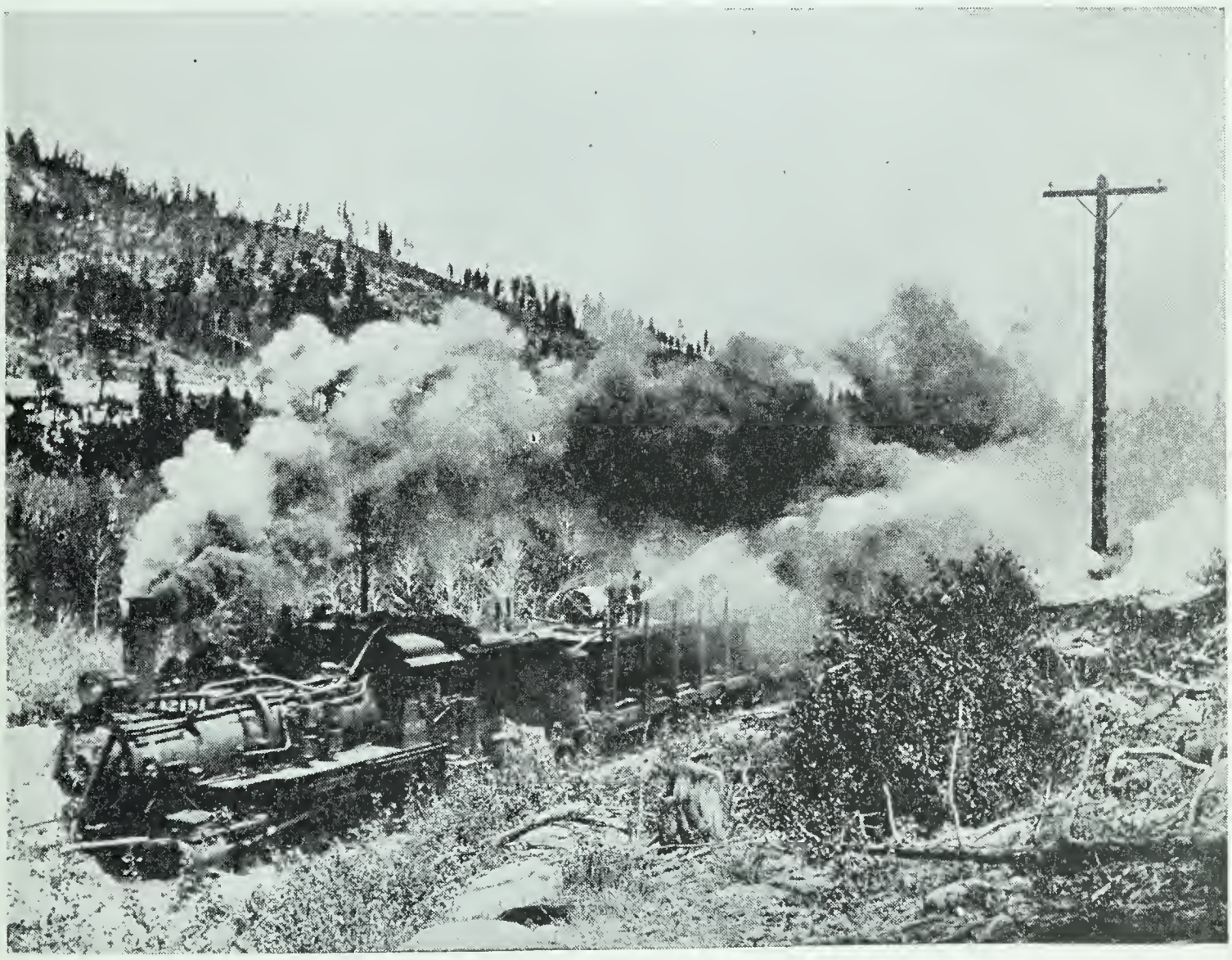


A Snow Train Clearing the Drifts

with a "booster" engine at the rear, to give a good shove when getting a heavy train under way or up a heavy grade.

There was no cab on the first locomotives, and the fireman and engineer often came in from a trip covered with ice and snow or drenched with rain. Today they, and with them all the gauges, levers, and indicators needed for the control of a big machine, are well sheltered.

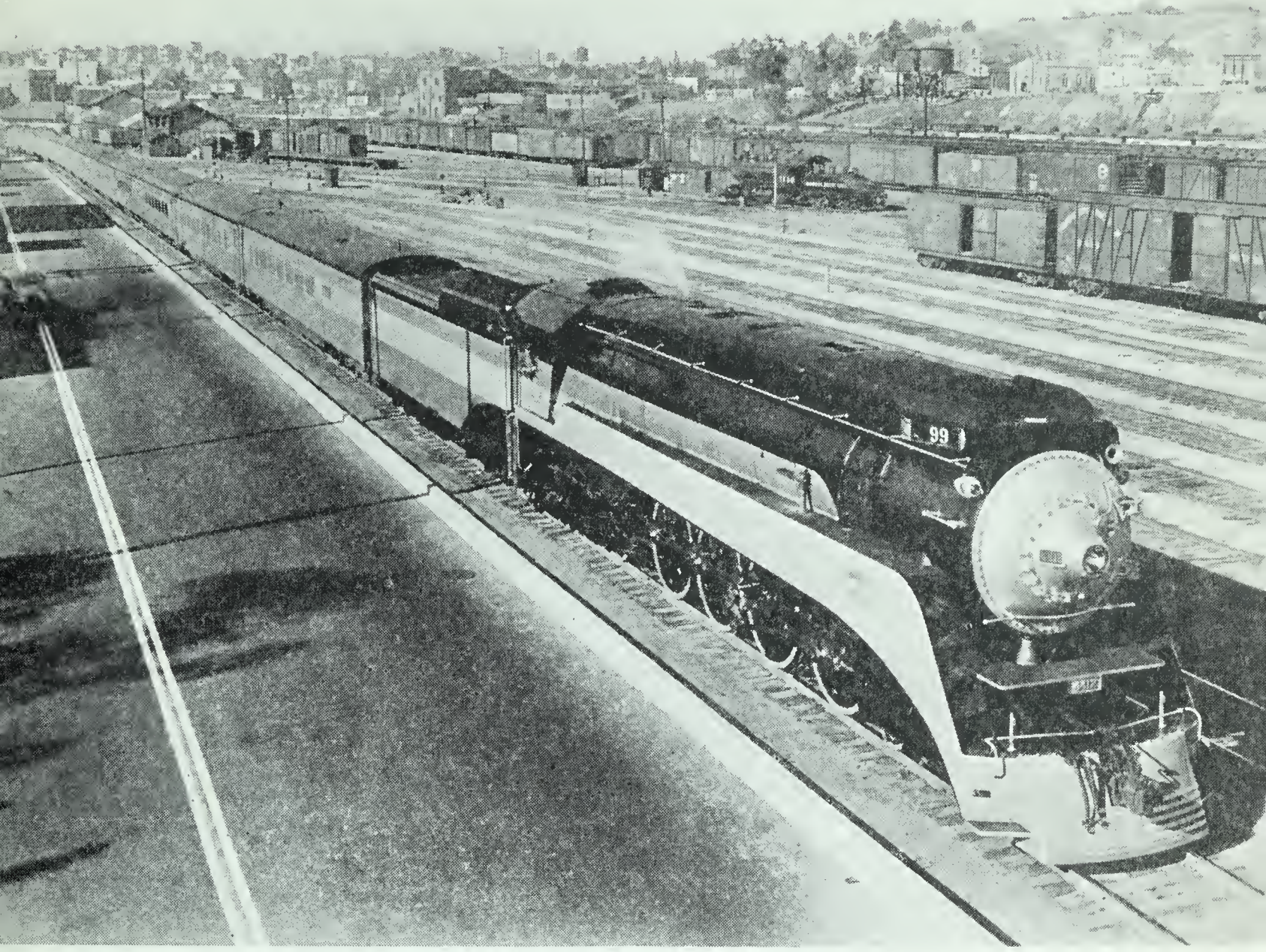
Electricity now runs many locomotives. On the far slopes of the Cascade Mountains, down the Alleghenies to tidewater with Virginia coal, under the Hudson River into New York City and on all trains as they enter New York City, down the lake front in Chicago, on the great



A Fire Train Fighting Forest Fires

steel highways between Washington, Baltimore, Philadelphia and New York, and in various other places, the steam locomotive is being outranked by the electric locomotive.

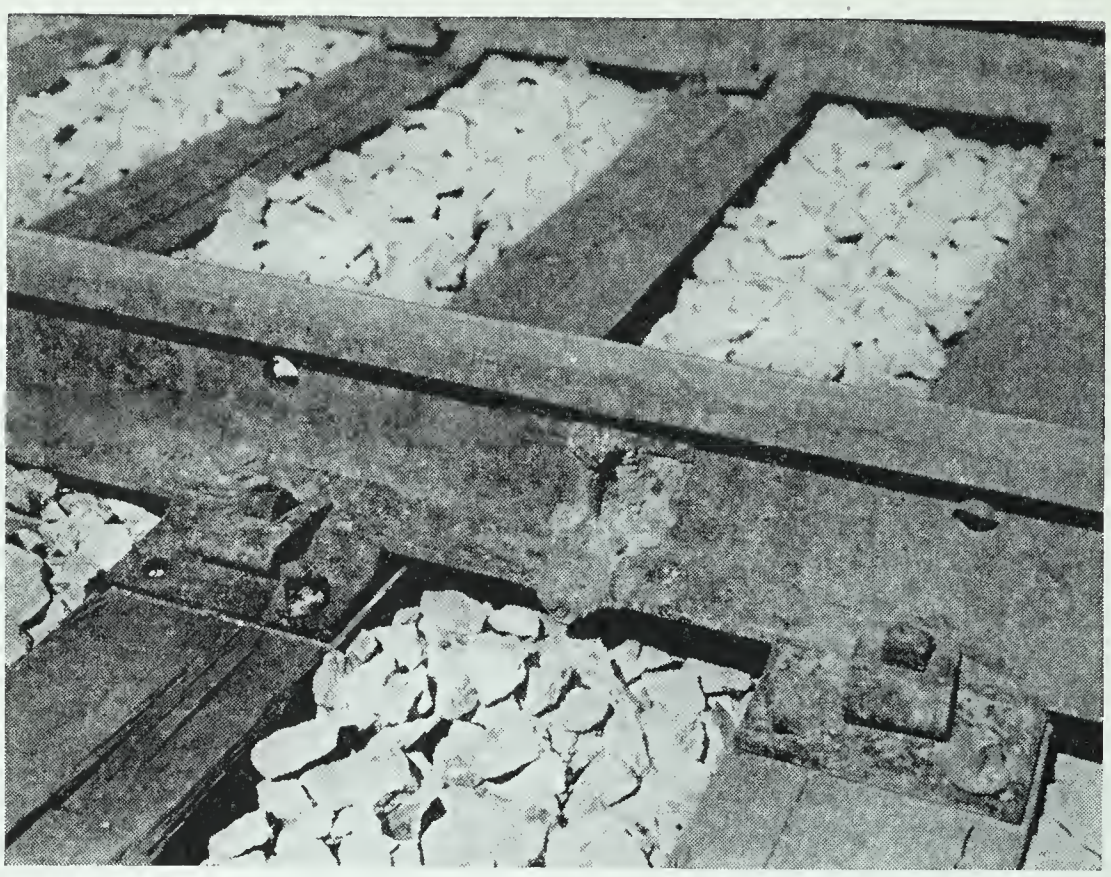
Oil-driven trains are also common. On the Pacific Coast, which is far from coal supplies, but where oil is produced in large quantities, oil-burning locomotives have long been in use. There is a heavy oil burner that is unique. The cab is on the front of the engine, where the smokestack usually is. The headlight is on the cab roof. This arrange-



The Streamliner "Daylight," Which Runs between San Francisco and Los Angeles

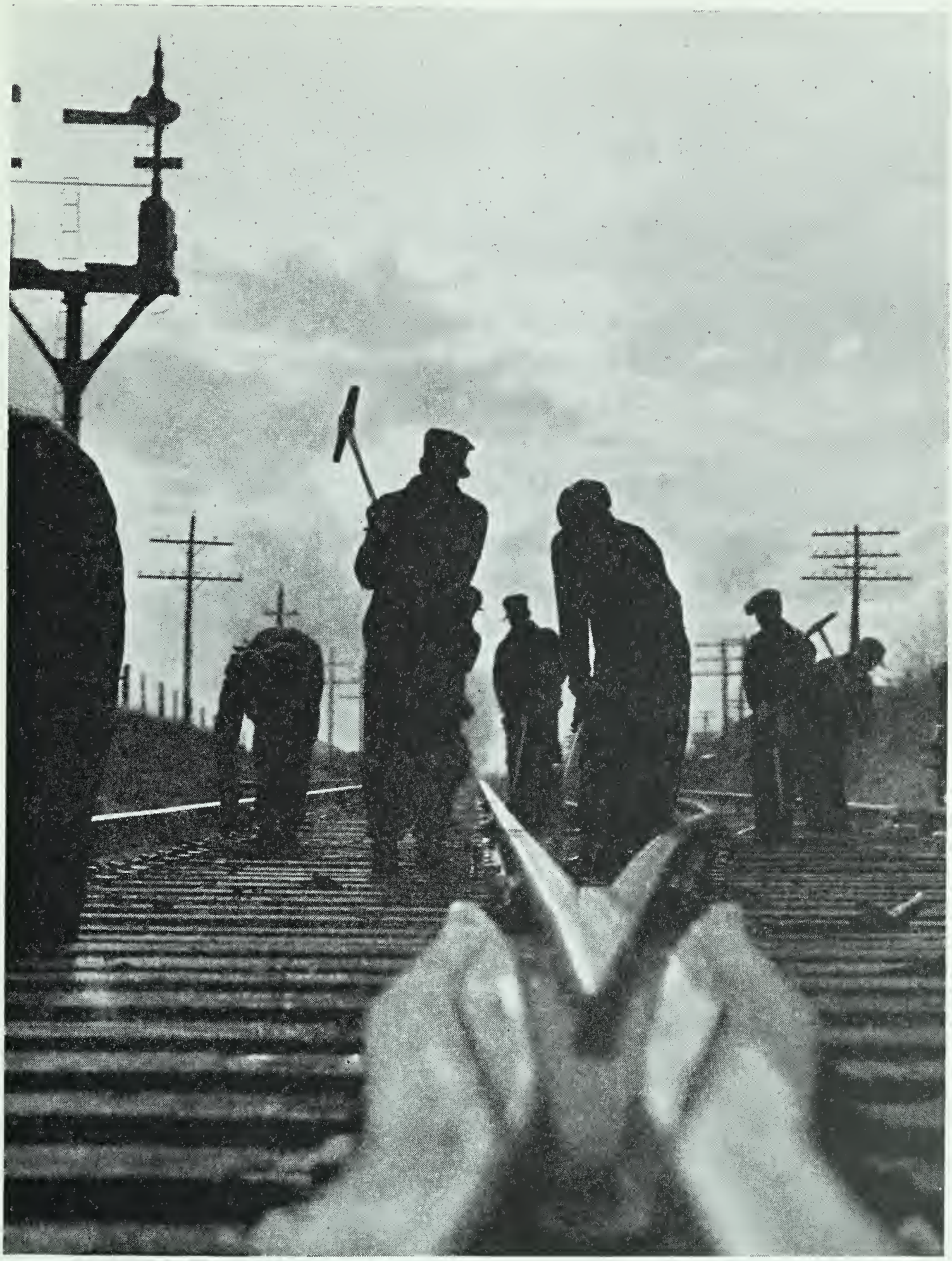
ment can be made on an oil burner because the fireman doesn't have to shovel coal. An oil burner often carries five thousand gallons of oil. Imagine how much this is, when your automobile carries only fifteen or twenty gallons of gasoline.

We have today streamlined trains, some of them with Diesel engines, or with Diesel-electrics. The Diesel is an internal combustion engine, using gasoline or oil. A Diesel-electric is a Diesel engine that operates an electric generator which supplies the power to drive the train. Some



A Continuous Track. Note the Welded Rail Ends

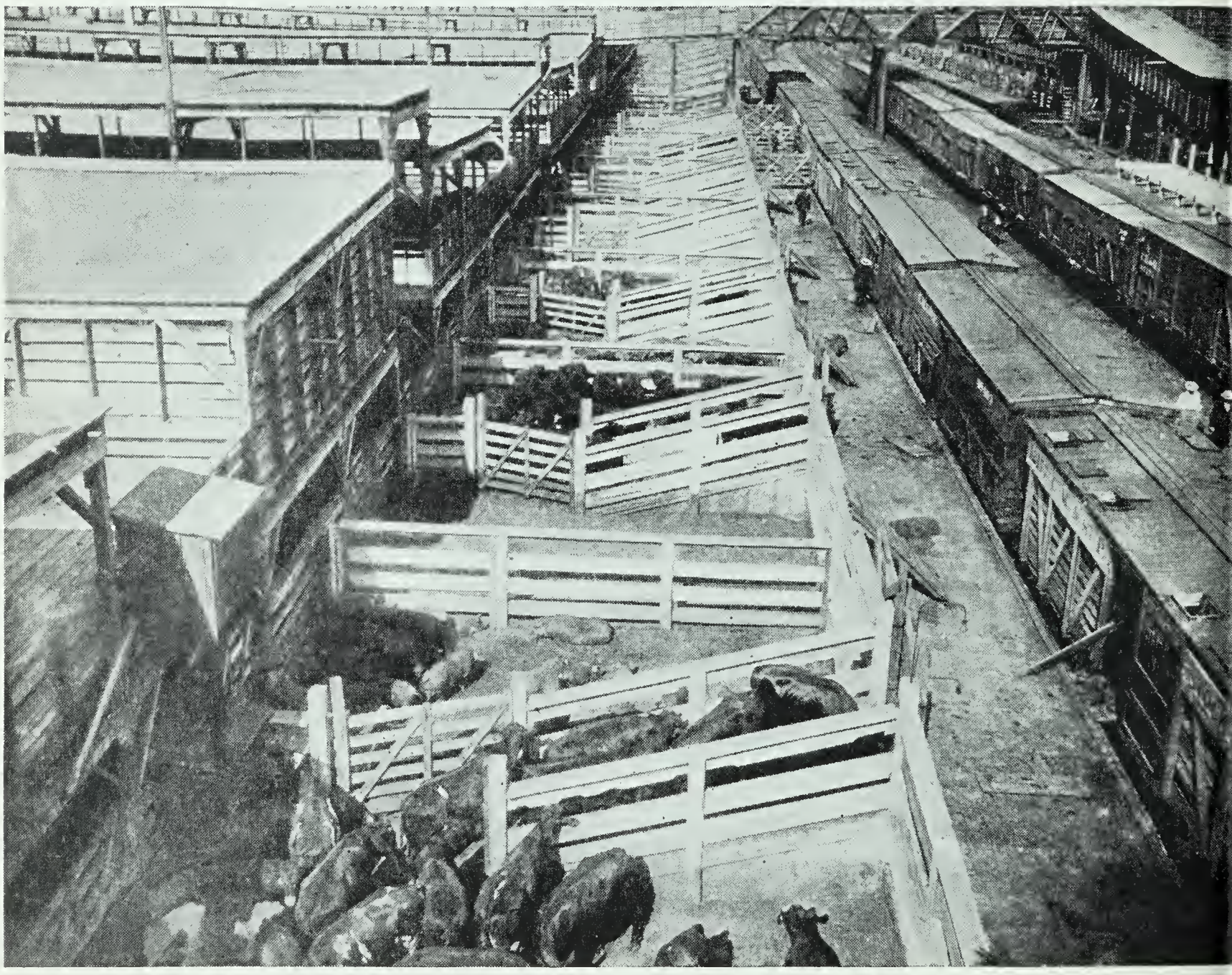
Concrete Crossties



Repairing Tracks at a Cross-over Switch

of these modern trains are so constructed that engine and cars are all in one unit. They are called *articulated trains,* and look somewhat like one long coach. They are built of steel alloys which, although light of weight, are of great strength; some of the trains weigh only about one-fifth of what an ordinary train will weigh. They are more perfectly streamlined than an airplane and have a sustained speed of a hundred to a hundred twenty miles an hour.

Thus the speed they make is much greater than that of the steam

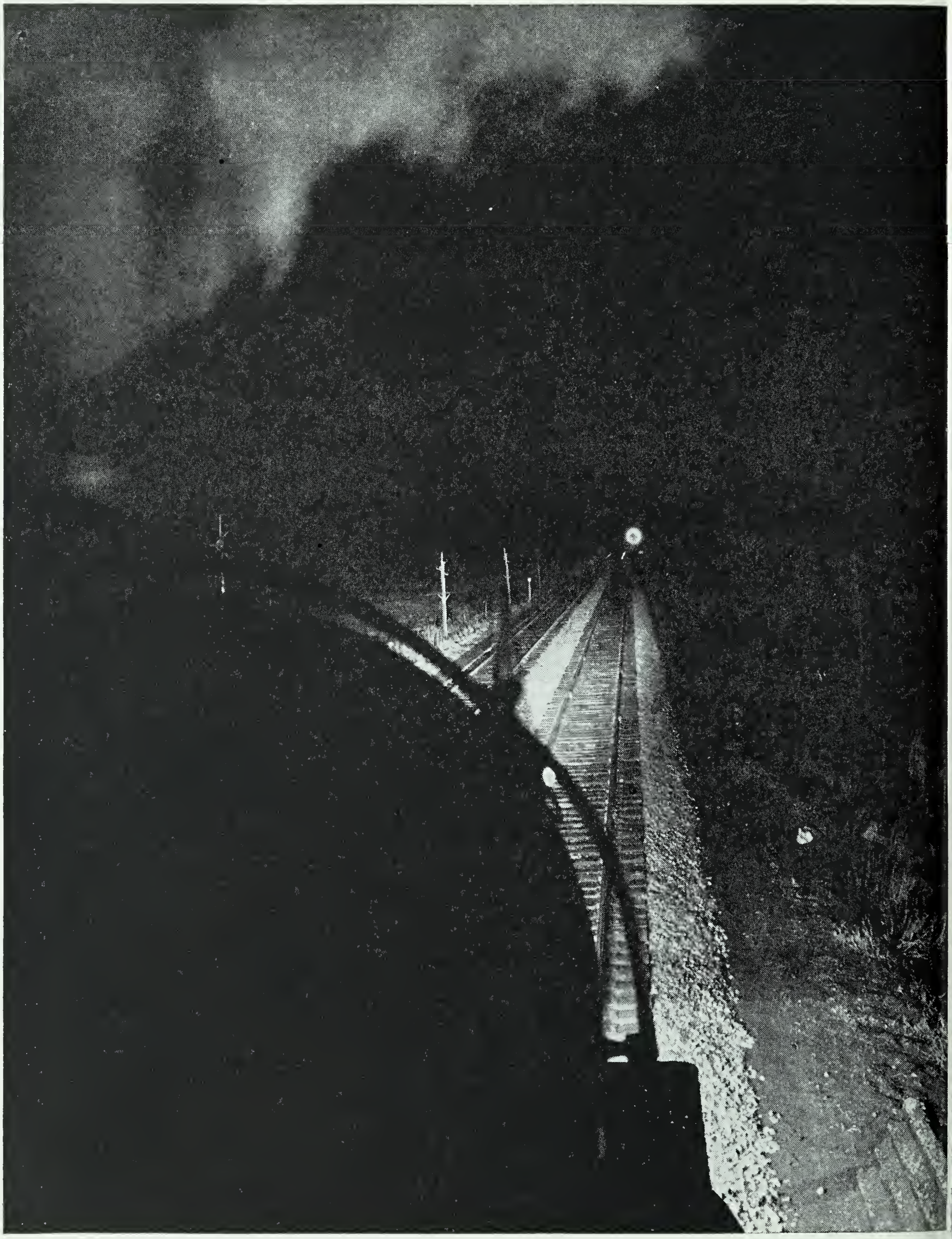


Loading Cattle for Shipment

locomotive that was designed along the old lines. The famous *Zephyr*, making the trip from Denver to Chicago, ran at an average speed of seventy-seven and a half miles an hour. Both the *Zephyr*, built for the Burlington Route, and the *M-1001*, of the Union Pacific, reach a speed of a hundred twenty miles an hour without any difficulty.

This question of weight has become a most important one on American roads. The average train of ten Pullmans, carrying perhaps one hundred eighty or two hundred passengers, weighs from eight hundred to eight hundred fifty tons. That means that the railroad is carrying some four or five tons of train for each passenger. Sometimes it runs to twice that amount. The new metal-alloy trains will reduce this weight to as low as five hundred pounds of train for each passenger. This is a most important change.

The problem of weight having thus been taken care of, the roads are giving much attention to the question of speed. Travel by air has made it necessary for them to meet the air competition with measures looking to faster schedules as well as to greater comfort. They are endeavoring to do both; the new types of streamlined, lightweight equipment have speeded up schedules considerably. It must be borne in mind, though, that stepping up schedules to a hundred miles or more per hour, is not altogether a question of speedy locomotives. Tracks have to be leveled with even greater care than ever before; the outer rail on curves has to be raised to take the higher speed; bearings and lubricants have to be changed to stand up under the new schedule; signals have to be set farther apart; more grade crossings have to be done away with. A score of new problems confronts the road that wants to meet this new requirement for speed.



All Clear!

So it looks as if the old-style locomotive, sooner or later, is likely to be outranked. It is not to be wondered at. On a steam locomotive, powerful as it has proved to be, more than nine-tenths of all the energy produced by the burning coal has been wasted in friction, noise, and smoke. That was not very economical; and economy was never more important on a railroad than it is today.

There is something very likable about an engine, though. No wonder that boys dream their daydreams about becoming locomotive engineers. It takes courage and skill, a steady eye and a firm hand. And it means close touch with a living, throbbing power.

I find myself humming as I write two of the many stanzas of the thrilling ballad of Casey Jones.

"Casey," says the fireman, "you're runnin' too fast.
You run that block-board last station we passed."
Casey says, "I believe we'll make it though,
For she steams a lot better than ever I know."

"Fireman," says Casey, "Don't you fret.
Keep knockin' at the fire door; don't give up yet.
I'm goin' to run her till she leaves the rail,
Or make it on time with the Southern Mail."

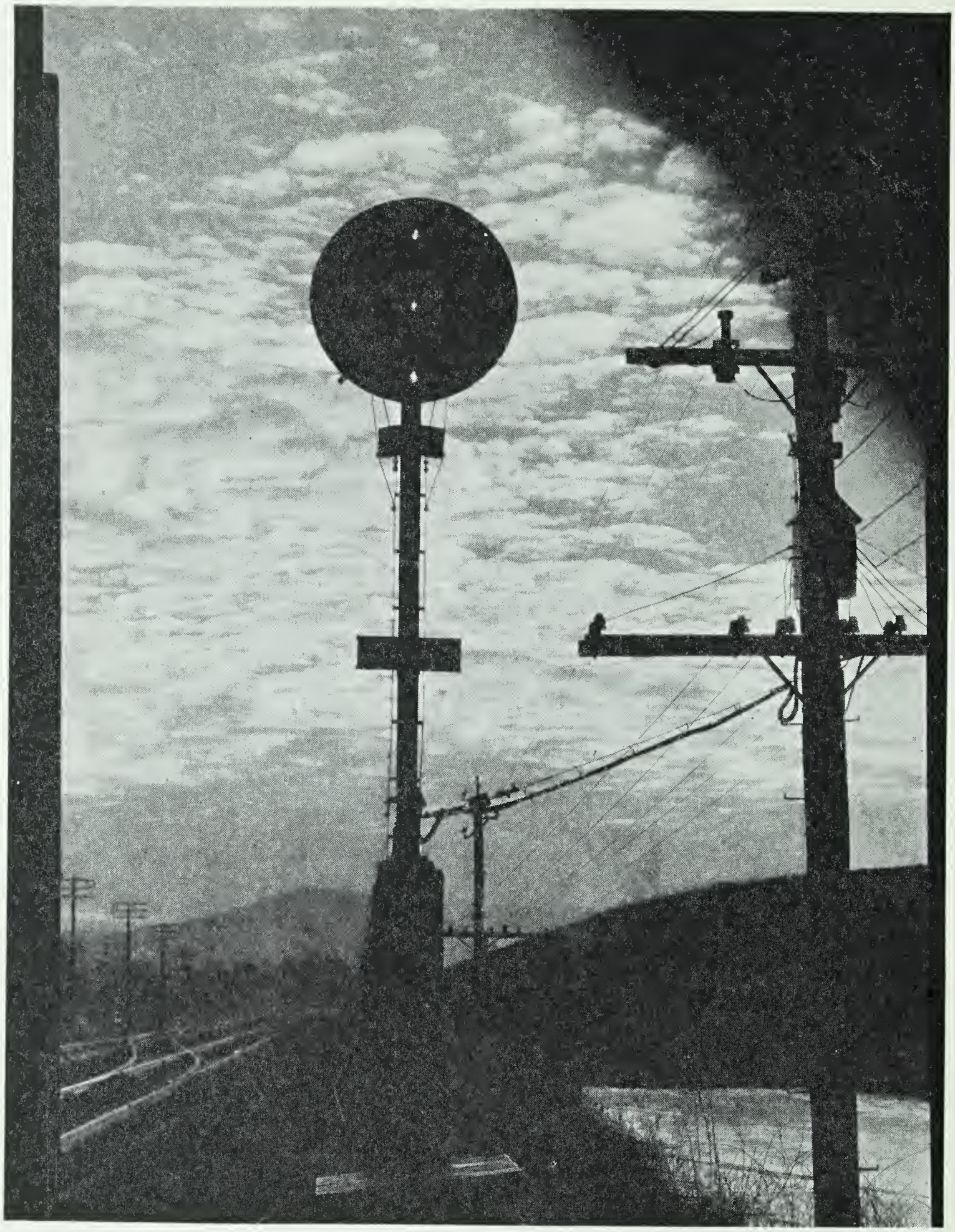
Railroads today aren't run on so reckless a plan as that. But the spirit of Casey Jones still haunts many a locomotive cab.

12

Everywhere You Go!

ONCE upon a time, in India, some men were hunting tigers. It was just below the lofty Himalayas, where the great Terai forest sweeps along between the mountains and the hot plains. The native hunters were beating up the long grass for The Striped One, who was lying up after a heavy feed. The white men, on elephants, were watching for the first sign that the tiger was on the move. The pathless, orchid-hung forest swept by on the left, the snow-clad mountains above it, while on the right stretched the endless plains. Not a hut or a human soul was in sight.

And then what do you think? There was a rush and a roar, and the



Always on Guard

Calcutta Fast Mail went by, passengers, engine driver, and conductor all craning their necks to see the tiger hunt.

Railroads in India are operated for the most part for the benefit of the natives, who totally disregard all questions of day and night, and travel on what they call the *fire carriage* at all hours, closely crowded into the third-class cars, where they sit on the floor, or on a wooden bench, gossiping and chewing betel nuts and quite enjoying themselves. The educated East Indian, or native of high caste, travels much as do Europeans.

Railways are often found in most unexpected places. Even in America, where we have so many of them, they often surprise us by their unexpected appearance. A railroad man from the Eastern States went fishing up Lake Superior way. He had been out in the woods a week, seeing no one but his Indian guide; his only roads were deer paths; his only home was the camp at which he slept.

Then, one day, he came to a little rise in the forest, and looking down through the great pines, saw, one after another, like the shuttle on a loom, swift trains dash past. He had come unexpectedly upon one of the great steel highways that carry ore from the Lake Superior iron-ore region to the docks where it is shipped on great boats to the great manufacturing centers. It was as if a magic carpet had whisked him back in an instant to the cities of men.

That's the way with railroads. In India or here at home they are never far away.

One of the most famous European trains is the *Orient Express.* It runs twice a week between Paris, Vienna, Bucharest, Athens, and Constantinople. It is made up of *wagons-lits,* which is French for sleeping

The Classification Yard

Note the hump in the foreground from which the cars run to their assigned tracks by gravi

cars, and is a very luxurious and handsomely appointed train.

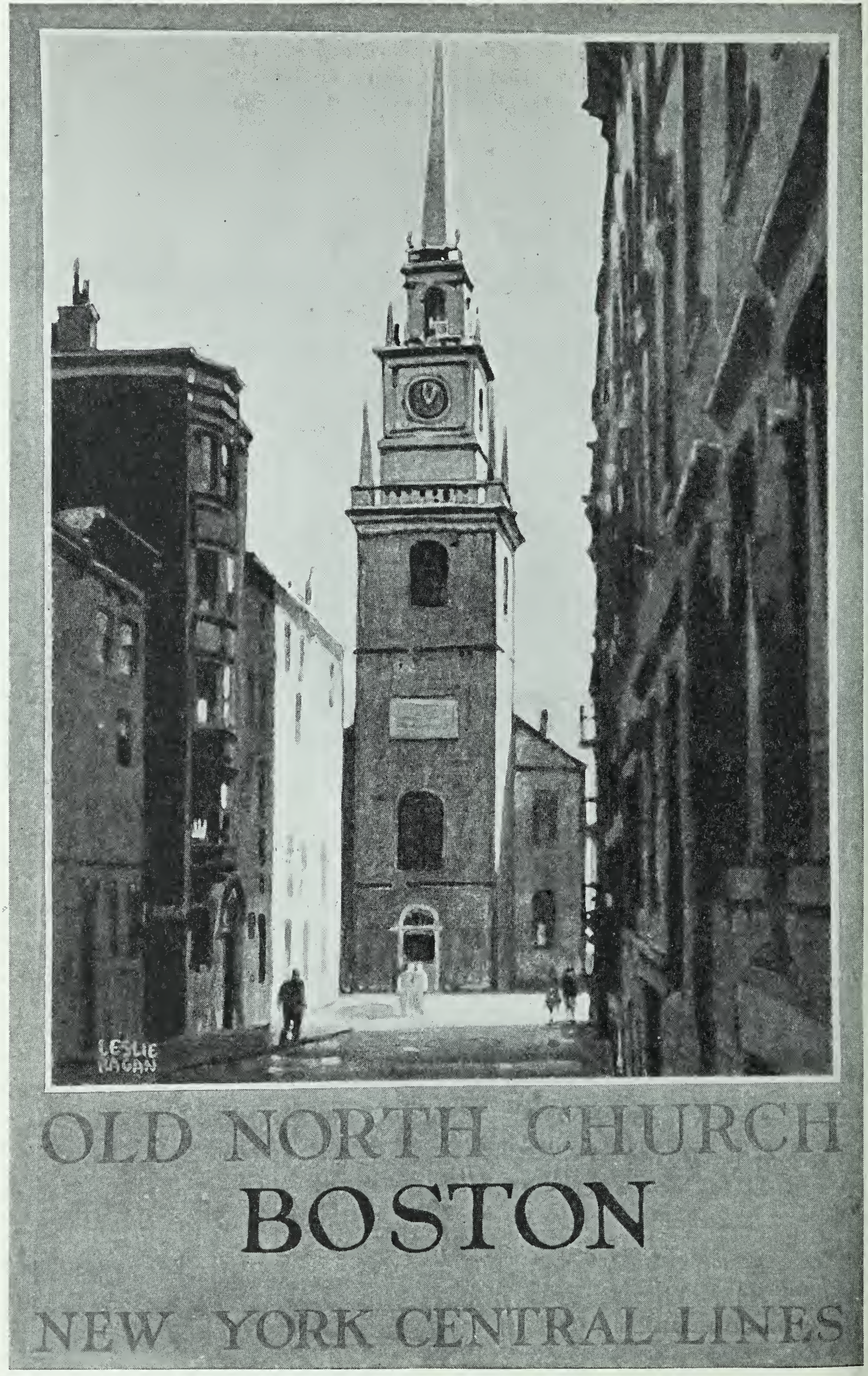
European locomotives and cars are not nearly so large or so heavy as American ones; the engines are so designed as to cover much of the pipes, cylinders, and other working parts, coming nearer to what we call streamlining on airplane or automobile and on our streamlined trains on American roads. In England and some other countries the engine is often painted in bright colors, with a broad bumper across

A Bridge for Automatic Block Signals

the front that gleams in bright red.

In Africa, too, there are railways. Most of them are in South Africa, and because of the mountainous country through which they pass, many of them are narrow-gauge roads. Their trains are not unlike English trains, with dining, sleeping, and observation cars, and a service of which the South Africans are quite proud. Other African railways are in the Belgian Congo, in Kenya Colony, and in Egypt, which are farther north.

But the big thing in African railways is what is known as the Cape-



A View of Boston—An American Railroad Poster

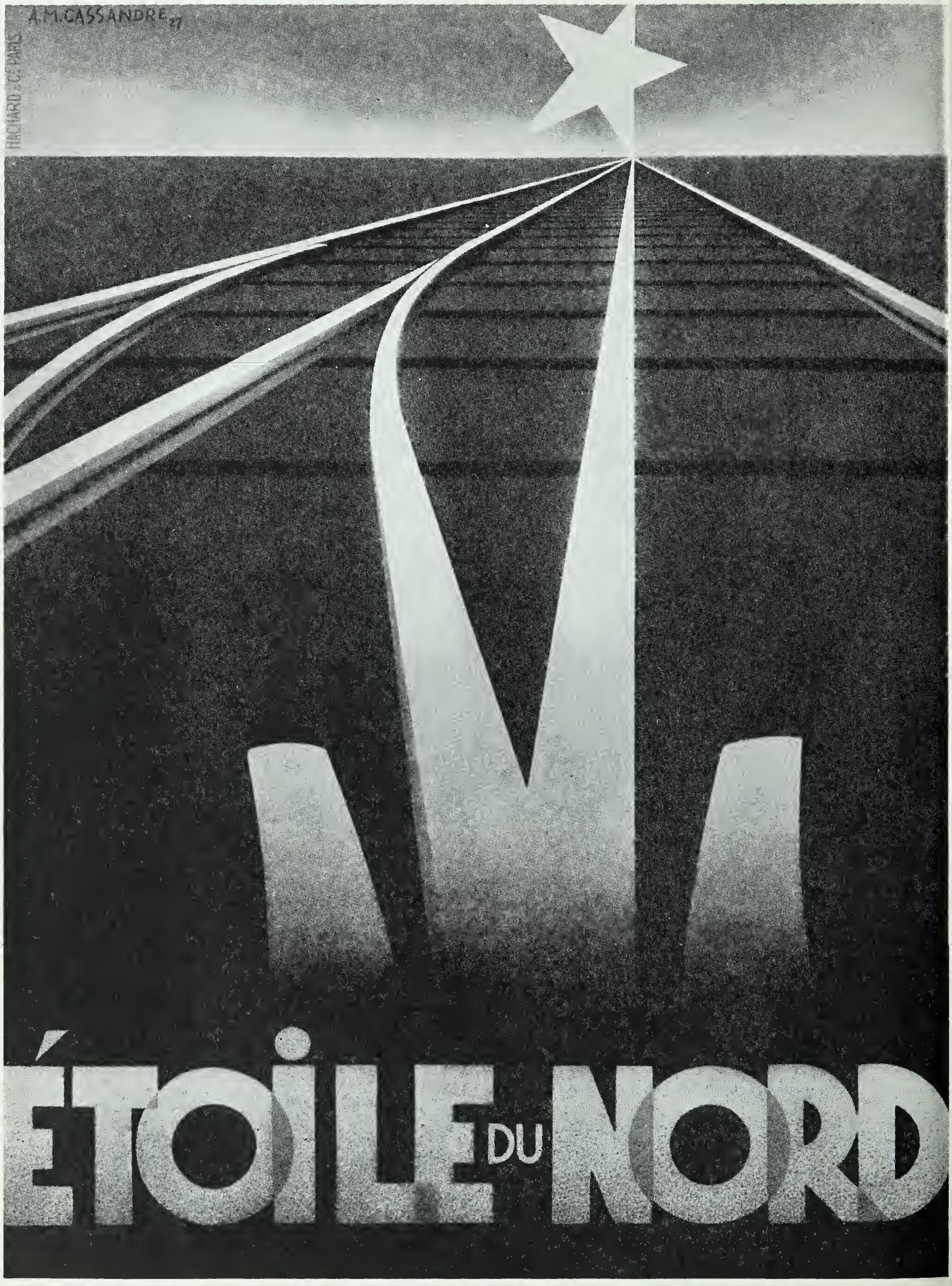
A Modern Engine—An American Railroad Poster

A Modern Railroad Viaduct

to-Cairo road. Some day it will reach clear across the African continent from south to north, from Capetown to Cairo. It is Africa's great hope and pride, just as our first transcontinental road was with us. In time they will have it. In fact it is so nearly finished that, with some gaps filled by motor travel and by steamer on Lake Tanganyika and down the Nile, the continuous journey from Capetown to Cairo can now be made.

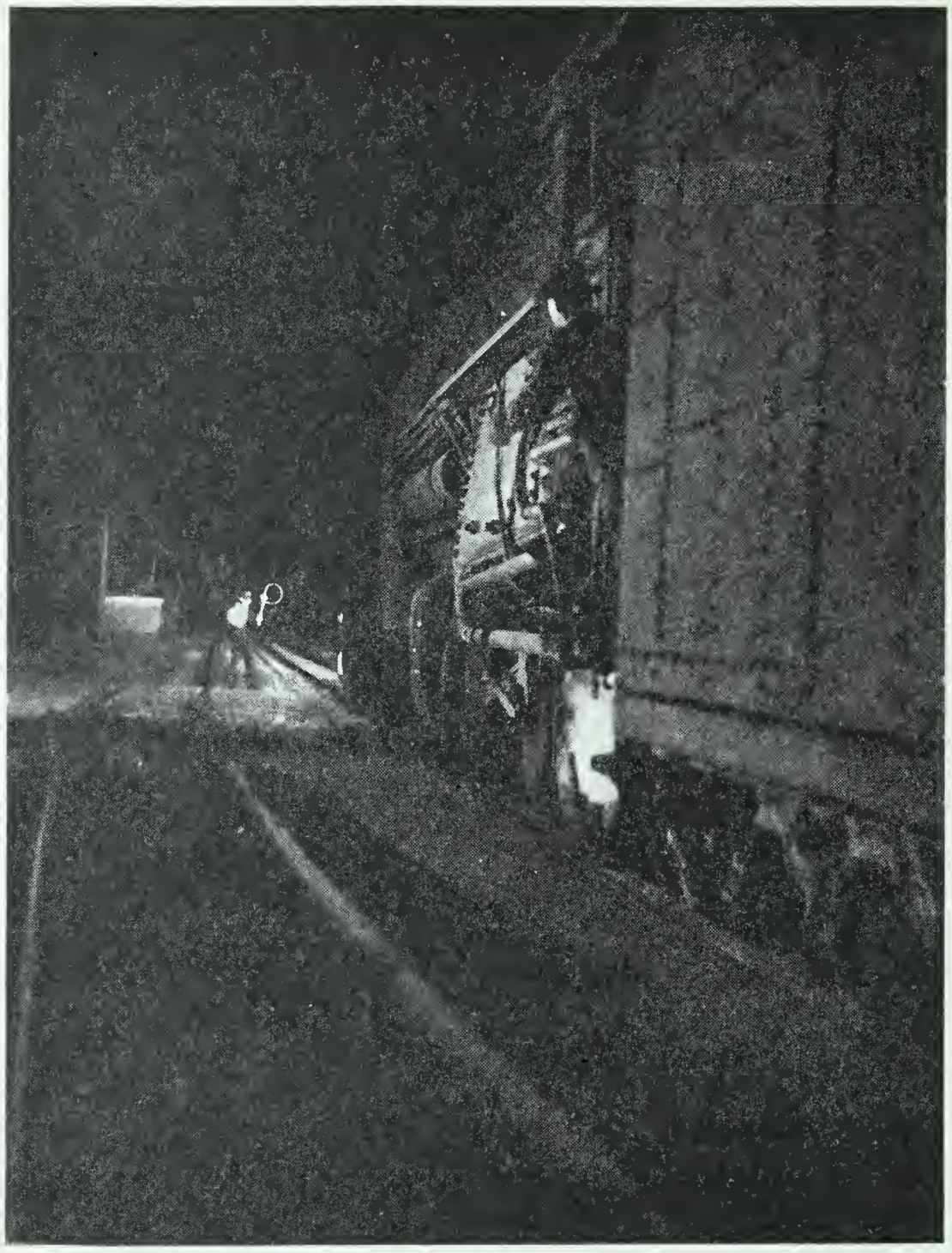
A Drawbridge

These African trains are sometimes like the *Calcutta Mail;* wild beasts will get mixed up with them. Elephants tear down the telegraph wires, and wild game often wanders out on the track. Men even tell of a lion who once perched on a station roof. He nearly scared the native telegraph operator out of his wits. The man wired headquarters frantically: "Please, sar, what to do? Lion on roof. Other lion on platform. Please instruct."



The Track—A French Railroad Poster

The Countryside—A German Railroad Poster



The Engineer Catches a Message without Stopping the Train

The Chinese have a few roads—not many. But something has happened to them; what with years of local wars and strife, the railroads have broken up, or broken down, until the pleasures of travel by rail in that difficult country are but little known.

In South America the railroads thrive. They have been built mostly with American or English money. In Argentina there is a famous rail-

road that crosses the mountains into Chile. It is called the Trans-Andean Road, and rises to a height of 10,512 feet above sea-level —almost two miles high—then drops down the western slopes of the Andes to Santiago, in Chile. It, too, is a transcontinental road; you can travel over it by rail from the Atlantic to the Pacific Ocean.

In Cuba, which is a long and narrow island, a railroad runs its entire length like the backbone of a fish. In Mexico there are many roads, and in Canada the railroads have done much to open up the great wheat fields of western Canada, just as our own roads have done for us.

Some of us have traveled in France, Italy, and Germany, and have seen the railroads there. Most of them are owned by the State, just as

A Ski Train

Off for a Journey

our American Government owns and operates the post offices.

American railroads are not like that; they are what is called *privately owned.* In England and in America we have what we call *government control.* Our President names men who form what we call the *Interstate Commerce Commission,* which lays down general rules to govern the manner in which our railways shall be run. This commission says how much it should cost to build a railroad; how much money

it may borrow; and what sums it shall charge for a passenger's ticket, or for carrying a ton of freight.

To ship a ton of freight a mile in America costs *just a little over one cent.* That doesn't mean that you can take a ton of freight down to the station, pay the agent a penny, and have the freight carried a mile. But

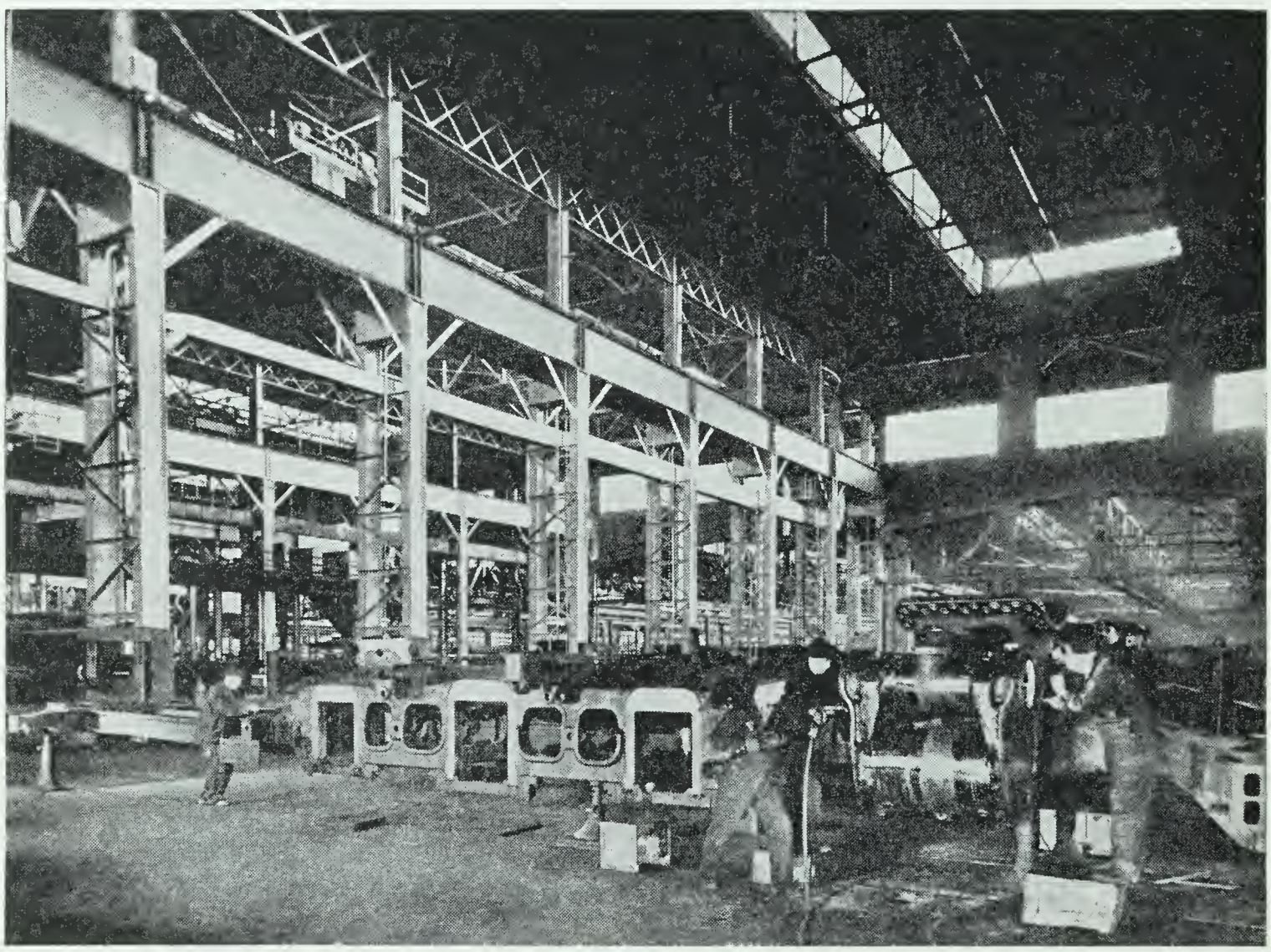
In the Cascade Range

on the average, with carload shipments, each car carried many miles, it costs the shipper that amount.

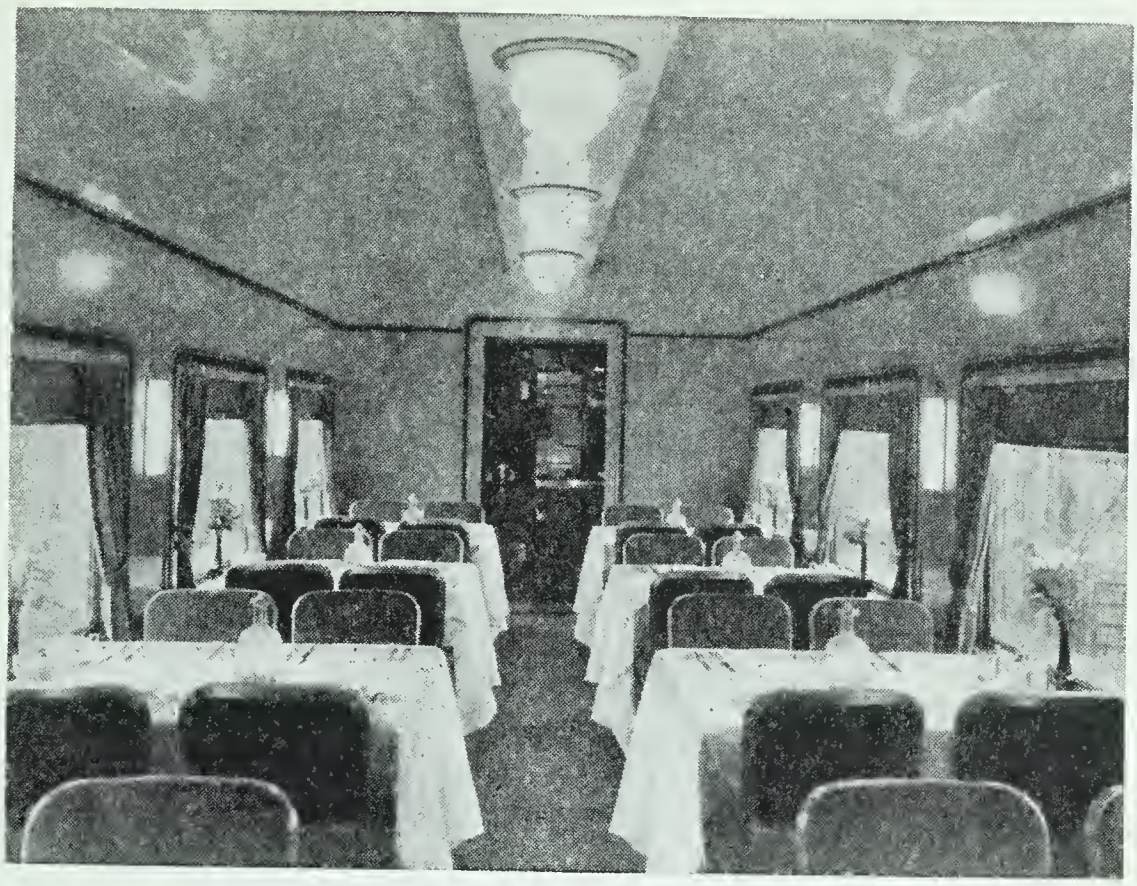
Safety, too, is one of the government's great interests. The commission also tells the railroads what safety appliances each road must use, such as automatic couplers and air brakes.

All of this government control is exercised because railroads are what are known as *common carriers.* That means that all of us have the right to ride on them, to ship freight over them, and to receive mail that is carried on them. This must be done for everyone at the same price. The railroads are for the *public convenience.*

In the United States there are more than two hundred fifty thou-



A Locomotive Frame—One Solid Piece of Cast Steel



The Dining Car

sand miles of railroad track—more than half of all the railroads in the world. We have brought much to the railroads, too—the air

Dump Car Used for Construction Work

brake, the telegraph, the telephone and the electric light. As we think of these things, we sometimes forget what other countries have done. England brought them the greatest gift of all—the locomotive, which, after all, is the heart of the whole thing.

In England, the railroads are very fine. While we built many American roads hurriedly, and through unsettled country, the English built their roads to stay! Their tracks, bridges, and tunnels are of the best. Their trains are luxurious and beautiful. Some of their travel customs are strange to us. But whether you travel on a German *Eisenbahn*, or a French *chemin de fer*, or on an English railway where what we call *rails* are known as *metals* or *plates*, you are still on a railway, and they're pretty good railways at that!

We can feel a good deal like the old Tibetan Lama in Kipling's story of "Kim." "A wonderful matter is the te-rain," he said. "One but asks a question and pays money, and the appointed persons dispatch all to the appointed place."

There isn't much required of the traveler these days, be he at home or abroad. Like the Lama, one but asks a question, and the appointed persons dispatch all to the appointed place. And how near together it brings us all! Lama and South African, Canadian and Pole! Here we are talking of Europe and India and Africa, and they all seem like one small land. "Who is thy neighbor?" was asked two thousand years ago. And the railroads answer: "Everyone; the world is very small."

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